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FILE COVERS 1907 - 3 May 2006 VOL 144 ISS 19

FILE LAST UPDATED: 2 May 2006 (20060502/ED)

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This file contains CAS Registry Numbers for easy and accurate substance identification.

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L1	795	SEA FILE=REGISTRY ABB=ON	PLU=ON	TETRAHYDROBORATE OR HYDROBORA TE
L2	11	SEA FILE=REGISTRY ABB=ON	PLU=ON	SODIUM BOROHYDRATE?/CN OR LITHIUM BOROHYDR?/CN OR POTASSIUM BOROHYDR?/CN
L3	104214	SEA FILE=REGISTRY ABB=ON	PLU=ON	METAL OR METALS OR MAGNESIUM
L4	128483	SEA FILE=REGISTRY ABB=ON	PLU=ON	BORATE
L5	15523	SEA FILE=HCAPLUS ABB=ON	PLU=ON	L1 OR TETRAHYDROBORATE OR HYDROBORATE
L6		SEL PLU=ON L2 1- CHEM :	52	TERMS
L7	15422	SEA FILE=HCAPLUS ABB=ON	PLU=ON	L6
L8	15583	SEA FILE=HCAPLUS ABB=ON	PLU=ON	L7 OR (SODIUM OR LITHIUM OR POTASSIUM) (2A) BOROHYDR?
L9	4137887	SEA FILE=HCAPLUS ABB=ON	PLU=ON	L3 OR METAL OR MAGNESIUM
L10	166954	SEA FILE=HCAPLUS ABB=ON	PLU=ON	L4 OR BORATE
L12	15254	SEA FILE=HCAPLUS ABB=ON	PLU=ON	L10 (L) L9
L14	38473	SEA FILE=HCAPLUS ABB=ON	PLU=ON	L10 (L) (RCT/RL OR RACT/RL)
L15	250013	SEA FILE=HCAPLUS ABB=ON	PLU=ON	L9 (L) (RCT/RL OR RACT/RL)
L16	2579	SEA FILE=HCAPLUS ABB=ON	PLU=ON	L12 AND L14
L17	1952	SEA FILE=HCAPLUS ABB=ON	PLU=ON	L16 AND L15
L18	104576	SEA FILE=REGISTRY ABB=ON	PLU=ON	PALLADIUM/BI
L19	208	SEA FILE=REGISTRY ABB=ON	PLU=ON	PT/MF
L21	513099	SEA FILE=HCAPLUS ABB=ON	PLU=ON	L18 OR L19 OR PALLADIUM OR PLATINUM OR PD OR PT
L25	3041	SEA FILE=HCAPLUS ABB=ON	PLU=ON	(L5 OR L8) (L) (PREP?/RL OR PREP OR PREPARTION)
L26	78	SEA FILE=HCAPLUS ABB=ON	PLU=ON	L17 AND L25
L27	11	SEA FILE=HCAPLUS ABB=ON	PLU=ON	L26 AND L21
L28	9	SEA FILE=HCAPLUS ABB=ON	PLU=ON	L27 AND PD=<NOVEMBER 25, 2003

Valenrod 10\_721479

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=> d ibib abs hitstr 128 1-9

L28 ANSWER 1 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2002:475940 HCAPLUS

DOCUMENT NUMBER: 138:26390

TITLE: Hydrogen generation using sodium borohydride solution and metal catalyst coated on metal oxide

AUTHOR(S): Kojima, Yoshitsugu; Suzuki, Ken-ichirou; Fukumoto, Kazuhiro; Sasaki, Megumi; Yamamoto, Toshio; Kawai, Yasuaki; Hayashi, Hiroaki

CORPORATE SOURCE: Toyota Central Research &amp; Development Laboratories, Inc., Nagakute-cho, Aichi-gun, Aichi, 480-1192, Japan

SOURCE: International Journal of Hydrogen Energy (2002), 27(10), 1029-1034

CODEN: IJHEDX; ISSN: 0360-3199

PUBLISHER: Elsevier Science Ltd.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Sodium borohydride (NaBH<sub>4</sub>) reacted slowly with water to liberate 4 mol of hydrogen/mol of the compound at room temperature. Hydrogen generation was accelerated by applying metal-metal oxide catalysts such as Pt-TiO<sub>2</sub>, Pt-CoO and Pt-LiCoO<sub>2</sub>. As the size of metal crystallites decreased and the amount increased, the hydrogen generation rate increased. The hydrogen generation rates using Pt and LiCoO<sub>2</sub> were high compared with those using other metal and metal oxide, resp. It seemed that a key finding was that use of the supercrit. CO<sub>2</sub> method produced a superior catalyst. Borohydride ion was stabilized in alkaline solution containing at least 5 weight% of NaOH. Alkaline stabilized solution of NaBH<sub>4</sub>

can be applied as a hydrogen source. We found that Pt-LiCoO<sub>2</sub> worked as an excellent catalyst for releasing hydrogen from the stabilized NaBH<sub>4</sub> solution

IT 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses

RL: CAT (Catalyst use); USES (Uses)

(hydrogen generation by reaction of sodium borohydride with water using metal catalyst coated on metal oxide)

RN 7440-05-3 HCAPLUS

CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCAPLUS

CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

IT 16940-66-2, Sodium borohydride

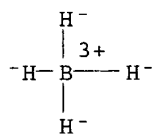
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)

(hydrogen generation by reaction of sodium borohydride with water using metal catalyst coated on metal oxide)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

Valenrod 10\_721479



REFERENCE COUNT:

17

THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS  
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L28 ANSWER 2 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1994:568925 HCAPLUS

DOCUMENT NUMBER: 121:168925

TITLE: Homoscorpionate (Tris(pyrazolyl)borate) Ligands  
Containing Tethered 3-Phenyl GroupsAUTHOR(S): Rheingold, Arnold L.; Ostrander, Robert L.; Haggerty,  
Brian S.; Trofimenko, SwiatoslawCORPORATE SOURCE: Department of Chemistry, University of Delaware,  
Newark, DE, 19716-2522, USASOURCE: Inorganic Chemistry (1994), 33(17), 3666-76  
CODEN: INOCAJ; ISSN: 0020-1669

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Four new homoscorpionate ligands were prepared, 3 of them involving a 3-Ph substituent subject to steric control via tethering to the the 4-position of the pyrazole ring. The tethering prevents major departure from parallel alignment of the Ph and pyrazolyl rings. The choice of the tether (methylene or 1,2-ethylene) results in the Ph 6'-CH being either pulled away from the metal in the former case or thrust toward the metal in the latter. The effect of the 5-Me substituent on the bite of the ligand was also explored. The new ligands were hydrotris(2H-benz[g]-4,5-dihydroindazol-2-yl)borate (=Tpa), hydrotris(3-methyl-2H-benz[g]-4,5-dihydroindazol-2-yl)borate (=Tpa,Me), hydrotris(1,4-dihydroindeno[1,2-c]pyrazol-1-yl)borate (=Tpb), and hydrotris(3-phenyl-5-methylpyrazol-1-yl)borate (=Tpb,Me), each of which differed subtly in its coordinative behavior from the other 3. Complexes L2M, LMX, LRh(COD), LRh(CO)<sub>2</sub>, LPd( $\eta^3$ -methallyl), and LMo(CO)<sub>2</sub>( $\eta^3$ -methallyl) were synthesized, and the structures of TpaRh(CO)<sub>2</sub>, Tpa,MeZnI, TpbTl, and Tpb,MeZnI were determined by x-ray crystallog. TpaRh(CO)<sub>2</sub> crystallizes in the space group P.hivin.1, with a 8.574(2), b 20.113(6), c 20.188(6) Å,  $\alpha$  61.68(2),  $\beta$  84.14(2),  $\gamma$  85.15(2)° for Z = 4. Tpa,MeZnI crystallizes in the space group P212121, with a 10.002(1), b 16.237(3), c 19.952(3) Å for Z = 4. TpbTl crystallizes in the space group P21/n, with a 11.363(2), b = 11.096(2) Å, c 21.010(4) Å,  $\beta$  99.33(2)° for Z = 4. The Ph and pyrazolyl planes are essentially coplanar. Tpb,MeZnI crystallizes in the space group Pna21, with a 32.645(6), b 11.327(3), c 16.180(3) Å for Z = 8. Cone and wedge angles were calculated for the new ligands and compared with revised previously reported values.

IT 157410-24-7P 157410-25-8P 157410-26-9P

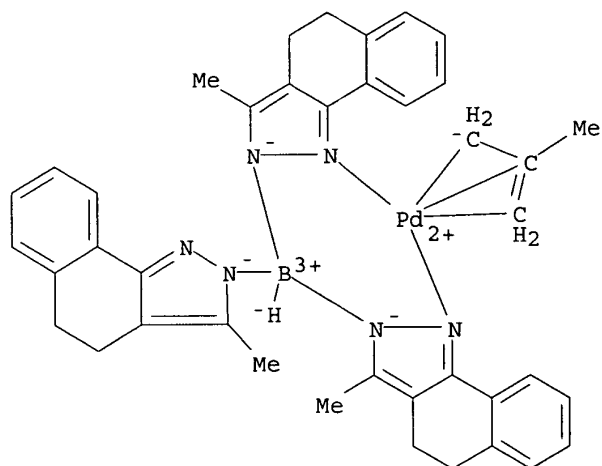
157441-22-0P

RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation of)

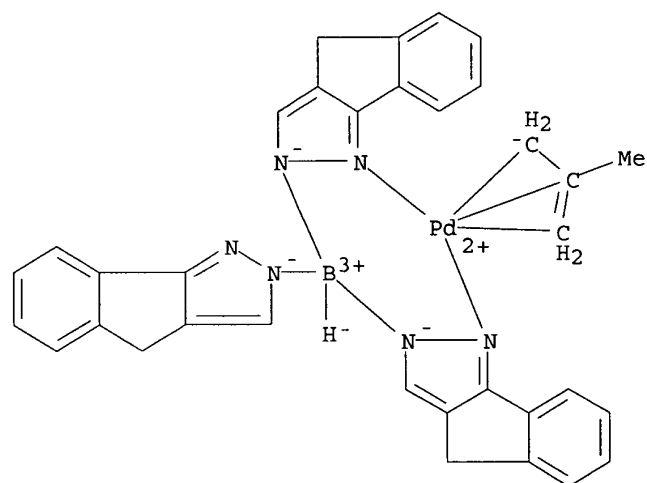
RN 157410-24-7 HCAPLUS

CN Palladium, [(1,2,3- $\eta$ )-2-methyl-2-propenyl][tris(4,5-dihydro-3-methyl-2H-benz[g]indazolato-N2)hydroborato(1-)-N1,N1']- (9CI) (CA INDEX NAME)

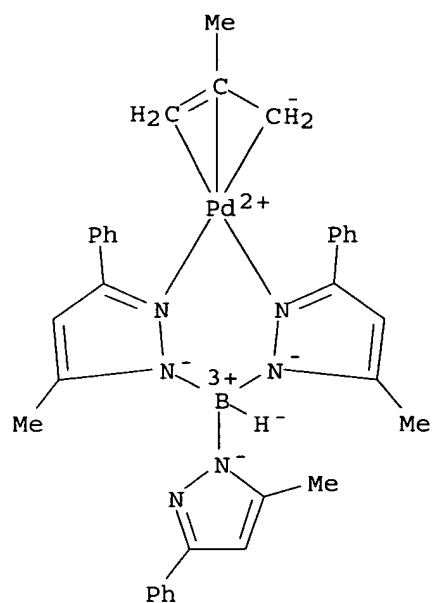
Valenrod 10\_721479



RN 157410-25-8 HCAPLUS  
 CN Palladium, [(1,2,3- $\eta$ )-2-methyl-2-propenyl] [tris(2,4-dihydroindeno[1,2-c]pyrazolato-N2)hydroborato(1-)-N1,N1']- (9CI) (CA INDEX NAME)

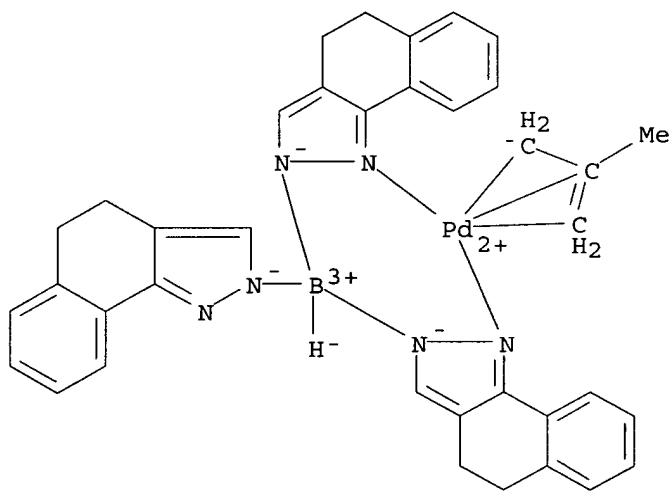


RN 157410-26-9 HCAPLUS  
 CN Palladium, [hydrotris(5-methyl-3-phenyl-1H-pyrazolato-N1)borato(1-)-N2,N2'] [(1,2,3- $\eta$ )-2-methyl-2-propenyl]- (9CI) (CA INDEX NAME)



RN 157441-22-0 HCAPLUS

CN Palladium, [(1,2,3-η)-2-methyl-2-propenyl] [tris(4,5-dihydro-2H-benz[g]indazolato-N2)hydroborato(1-)-N1,N1',N1'']- (9CI) (CA INDEX NAME)



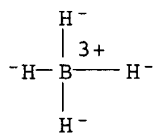
IT 13762-51-1, Potassium tetrahydroborate(1-)

RL: RCT (Reactant); RACT (Reactant or reagent)

(reaction of, with benzdihydroindazoles or dihydroindenopyrazole or phenyl(methyl)pyrazole)

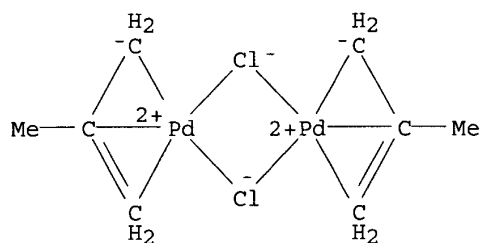
RN 13762-51-1 HCAPLUS

CN Borate(1-), tetrahydro-, potassium (8CI, 9CI) (CA INDEX NAME)



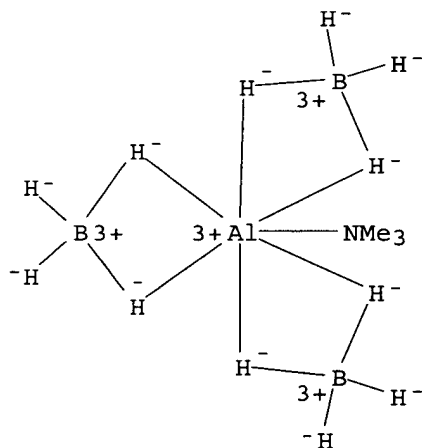
● K<sup>+</sup>

IT 12081-18-4, Bis(chloro(η<sup>3</sup>-2-methylallyl) palladium)  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (reaction of, with thallous tris(pyrazolyl)borate derivs.)  
 RN 12081-18-4 HCAPLUS  
 CN Palladium, di-μ-chlorobis[(1,2,3-η)-2-methyl-2-propenyl]di- (9CI)  
 (CA INDEX NAME)





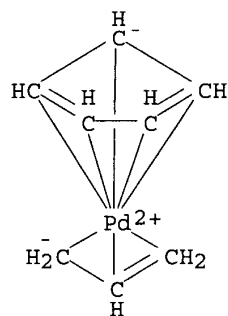
L28 ANSWER 3 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1994:437099 HCAPLUS  
 DOCUMENT NUMBER: 121:37099  
 TITLE: **Palladium** and aluminum thin film deposition  
 on thermally sensitive substrates from organometallic  
 complexes  
 AUTHOR(S): Datta, Saswati; Kim, Yoon Gi; Dowben, P. A.; Glass,  
 John A.; Kher, Shreyas S.; Peters, Scott A.; Spencer,  
 James T.  
 CORPORATE SOURCE: Int. Bus. Mach. Corp., Endicott, NY, 13760, USA  
 SOURCE: Metallized Plastics (1992), 3, 65-72  
 CODEN: MPFAEU; ISSN: 1068-7440  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB The UV decomposition of allylcyclopentadienyl **palladium**,  
 $[(\eta^3\text{-C}_3\text{H}_5)(\eta^5\text{-C}_5\text{H}_5) \text{Pd}]$  (I) has been used to deposit  
 relatively pure (>95% **palladium**) metal films with submicrometer  
 spatial resolution. The films deposited on polyimide resins were found to be  
 porous with no apparent damage to the substrate from the UV photoassisted  
 decomposition technique. The fabrication of **palladium** thin films  
 from I is consistent with the known energetics of the ligand to metal  
 bonds in the complex. The room temperature metalization of thermally sensitive  
 substrates, such as plastics, was also achieved from the decomposition of the  
 volatile aluminum borohydride complex,  $\text{AlH}_2(\text{BH}_4) \cdot \text{N}(\text{CH}_3)_3$ . Films of  
 thicknesses between 100 Å and 2 µm have been prepared and  
 characterized by SEM, Auger electron spectroscopy (AES), laser microprobe  
 mass anal. (LAMMA), x-ray diffraction (XRD), and energy dispersive x-ray  
 anal. (EDXA).  
 IT 19567-28-3, Aluminum tetrahydroborate, compound with NMe<sub>3</sub> (1:1)  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (decomposition of, chemical vacuum deposition of **metal** films on  
 polyimides by)  
 RN 19567-28-3 HCAPLUS  
 CN Aluminum, (N,N-dimethylmethanamine)tris[tetrahydroborato(1-)-H,H']-,  
 (PB-7-12-22'2'2''2'')- (9CI) (CA INDEX NAME)



IT 1271-03-0, Allylcyclopentadienyl **palladium**  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (decomposition of, laser radiation-induced, deposition of **metal**  
 films on polyimides by)  
 RN 1271-03-0 HCAPLUS

Valenrod 10\_721479

CN Palladium, ( $\eta^5$ -2,4-cyclopentadien-1-yl)( $\eta^3$ -2-propenyl)- (9CI) (CA INDEX NAME)



IT 7440-05-3P, **Palladium**, preparation  
RL: PREP (Preparation)  
(films, deposition of, on polymeric substrates, by laser  
radiation-induced allylcyclopentadienyl **palladium** decomposition)  
RN 7440-05-3 HCAPLUS  
CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

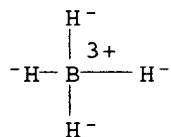
L28 ANSWER 4 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1990:525153 HCAPLUS  
 DOCUMENT NUMBER: 113:125153  
 TITLE: Preparation of magnetic powder containing rare earth elements  
 INVENTOR(S): Buchkov, D.; Dragieva, I.; Iliev, I.; Todorov, O.; Slavcheva-Staikova, M.  
 PATENT ASSIGNEE(S): Higher Institute of Electrical and Mechanical Engineering, Sofia, Bulg.  
 SOURCE: Ger. (East), 3 pp.  
 CODEN: GEXXA8  
 DOCUMENT TYPE: Patent  
 LANGUAGE: German  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
DD 271612	A7	19890913	DD 1986-291413	19860618 <--
PRIORITY APPLN. INFO.:			DD 1986-291413	19860618

AB A solution of water-soluble salts of a rare earth metal, Fe, Ni, Co, Cu, and Pd at concns. of  $1 + 10^{-3}$  to  $1 + 10^{-1}$  mol/L is mixed with aqueous Na borohydride or Na hypophosphite (reducing agent) at 0.05-1 mol/L and 10-90° for 1-30 min in a magnetic field of (1-8) + 105 A/m to give a magnetic powder.

IT 16940-66-2, Sodium borohydride  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (reduction by, of metal salt solns., in preparation of magnetic powders)

RN 16940-66-2 HCAPLUS  
 CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



● Na<sup>+</sup>

L28 ANSWER 5 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1989:534235 HCAPLUS

DOCUMENT NUMBER: 111:134235

TITLE: Unexpected regiochemistry in the reaction of  
benzotriazole with KBH<sub>4</sub>: synthesis of a new class of  
poly(azolyl)borate ligands

AUTHOR(S): Lalor, F. J.; Miller, S.; Garvey, N.

CORPORATE SOURCE: Dep. Chem., Univ. Coll., Cork, Ire.

SOURCE: Journal of Organometallic Chemistry (1988),  
356(2), C57-60

CODEN: JORCAI; ISSN: 0022-328X

DOCUMENT TYPE: Journal

LANGUAGE: English

OTHER SOURCE(S): CASREACT 111:134235

AB The reaction of KBH<sub>4</sub> with molten benzotriazole forms a series of  
poly(benzotriazolyl)borate anions [HnB(C<sub>6</sub>H<sub>4</sub>N<sub>3</sub>)<sub>4-n</sub>]<sup>-</sup> (n = 0-3) depending on  
the temperature. The regiospecificity of the process differs from that of  
pyrazole/BH<sub>4</sub><sup>-</sup> reactions in that B-N bond formation takes place in a manner  
that maximizes steric crowding at boron (i.e. at the triazole N(1) atoms).  
The complex-forming abilities of the new ligands have been investigated,  
and show some interesting differences from those of the  
poly(1-pyrazolyl)borate analogs.

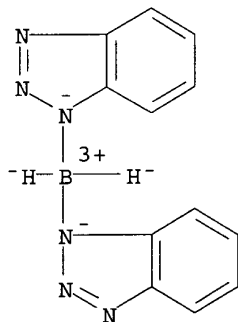
IT 109782-45-8P 122627-92-3P 122658-64-4P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP

(Preparation); RACT (Reactant or reagent)

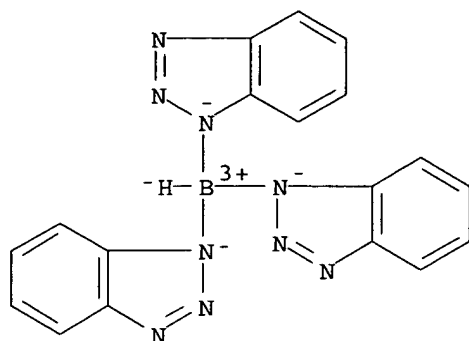
(preparation and reaction of, with transition metal complexes)

RN 109782-45-8 HCAPLUS

CN Borate(1-), bis(1H-benzotriazolato-κN1)dihydro-, potassium, (T-4)-  
(9CI) (CA INDEX NAME)● K<sup>+</sup>

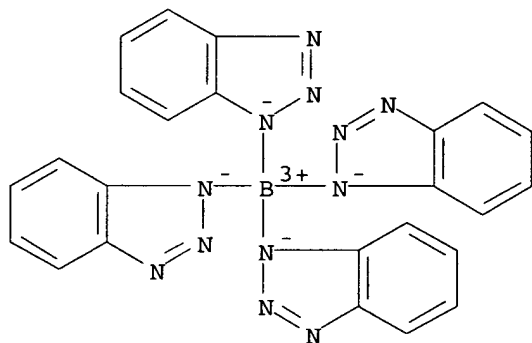
RN 122627-92-3 HCAPLUS

CN Borate(1-), tris(1H-benzotriazolato-κN1)hydro-, potassium, (T-4)-  
(9CI) (CA INDEX NAME)



● K<sup>+</sup>

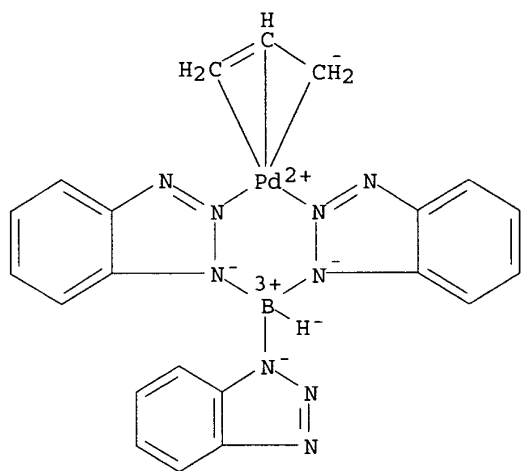
RN 122658-64-4 HCAPLUS  
 CN Borate(1-), tetrakis(1H-benzotriazolato-N1)-, potassium (9CI) (CA INDEX NAME)



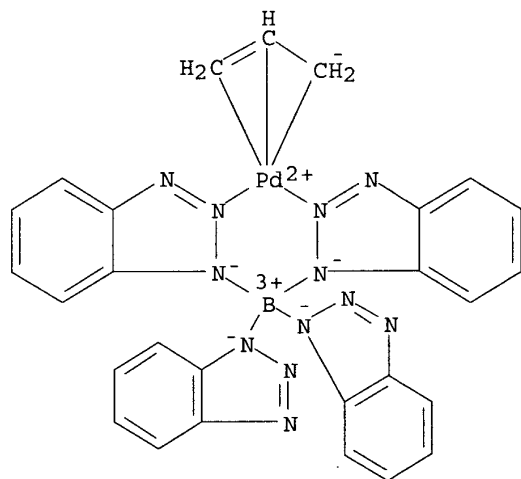
● K<sup>+</sup>

IT 122651-40-5P 122651-42-7P  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of)  
 RN 122651-40-5 HCAPLUS  
 CN Palladium, (η<sup>3</sup>-2-propenyl)[tris(1H-benzotriazolato-N1)hydroborato(1-)-N2,N2']- (9CI) (CA INDEX NAME)

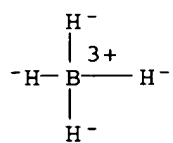
Valenrod 10\_721479



RN 122651-42-7 HCAPLUS  
 CN Palladium, ( $\eta^3$ -2-propenyl) [tetrakis(1H-benzotriazolato-N1)borato(1-) - N2,N2']- (9CI) (CA INDEX NAME)



IT 13762-51-1, Potassium tetrahydroborate  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (reaction of, with molten benzotriazole, regiochem. of)  
 RN 13762-51-1 HCAPLUS  
 CN Borate(1-), tetrahydro-, potassium (8CI, 9CI) (CA INDEX NAME)



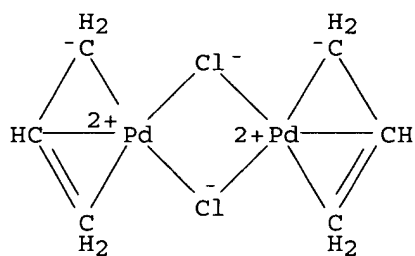
IT 12012-95-2

RL: RCT (Reactant); RACT (Reactant or reagent)

(reaction of, with poly(benzotriazolyl)borate anions)

RN 12012-95-2 HCAPLUS

CN Palladium, di-μ-chlorobis(η<sup>3</sup>-2-propenyl)di- (9CI) (CA INDEX NAME)



L28 ANSWER 6 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1984:124631 HCAPLUS

DOCUMENT NUMBER: 100:124631

TITLE: Concentration of **platinum** metals by reducing  
with sodium tetrahydroborate in the presence of  
manganese dioxide

AUTHOR(S): Khain, V. S.; Volkov, A. A.; Martynova, V. F.

CORPORATE SOURCE: Ukhtinsk. Ind. Inst., Ukhta, USSR

SOURCE: Zhurnal Prikladnoi Khimii (Sankt-Peterburg, Russian  
Federation) (1984), 57(1), 30-3

CODEN: ZPKHAB; ISSN: 0044-4618

DOCUMENT TYPE: Journal

LANGUAGE: Russian

AB **Pt**, **Pd**, and **Rh** were recovered from  $\text{H}_2\text{PtCl}_6$ ,  $\text{PdCl}_2$ , and  
 $\text{RhCl}_3$  solns. by reduction with  $\text{NaBH}_4$  at pH 4-10 in the presence of  $\text{KMnO}_4$ .  
 $\text{MnO}_2$  formed by the reaction of  $\text{KMnO}_4$  with  $\text{NaBH}_4$  served as a collector for  
**Pt**-group metals.IT **7440-06-4P**, preparationRL: PUR (Purification or recovery); **PREP (Preparation)**  
(recovery of, from hydrogen hexachloroplatinate solns., by reduction with  
**sodium borohydride**, manganese dioxide collector in)

RN 7440-06-4 HCAPLUS

CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

IT **7440-05-3P**, preparationRL: PUR (Purification or recovery); **PREP (Preparation)**  
(recovery of, from **palladium** chloride solns., by reduction with  
**sodium borohydride**, manganese dioxide collector in)

RN 7440-05-3 HCAPLUS

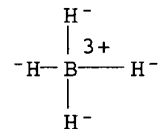
CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

IT **16940-66-2**RL: **RCT (Reactant)**; **RCT (Reactant or reagent)**  
(reduction by, of **platinum**-group metal chlorides, in  
aqueous solns.)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

●  $\text{Na}^+$ IT **7647-10-1**



Valenrod 10\_721479

RL: RCT (Reactant); RACT (Reactant or reagent)  
(reduction of, with sodium borohydride in aqueous media, **palladium**  
recovery by)

RN 7647-10-1 HCAPLUS

CN Palladium chloride (PdCl<sub>2</sub>) (6CI, 8CI, 9CI) (CA INDEX NAME)

Cl-Pd-Cl

L28 ANSWER 7 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1979:179411 HCAPLUS

DOCUMENT NUMBER: 90:179411

TITLE: Reaction of sodium tetrahydroborate with precious metal salts

AUTHOR(S): Mal'tseva, N. N.; Sterlyadkina, Z. K.; Erusalimchik, I. G.; Mikheeva, V. I.

CORPORATE SOURCE: USSR

SOURCE: Zhurnal Neorganicheskoi Khimii (1979), 24(3), 822-4

CODEN: ZNOKAQ; ISSN: 0044-457X

DOCUMENT TYPE: Journal

LANGUAGE: Russian

AB During the reaction of NaBH<sub>4</sub> with aqueous solns. of Ag, Au, Pd, and Pt salts, highly pure free metal precipitated. The stoichiometry of the oxidation-reduction reaction was established on the basis of the H evolved, solution pH, and amount of reducing agent added. In acidic solution hydrolysis of NaBH<sub>4</sub> occurred simultaneously with the oxidation-reduction process. The precipitated metal is highly dispersed and absorbs a significant amount of H.

IT 7440-05-3P, preparation

RL: SPN (Synthetic preparation); PREP (Preparation)

(preparation of, by reduction of palladium salts with sodium tetrahydroborate)

RN 7440-05-3 HCAPLUS

CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

IT 7440-06-4P, preparation

RL: SPN (Synthetic preparation); PREP (Preparation)

(preparation of, by reduction of platinum salts with sodium tetrahydroborate)

RN 7440-06-4 HCAPLUS

CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

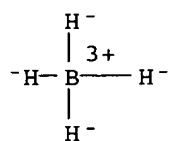
IT 16940-66-2

RL: RCT (Reactant); RACT (Reactant or reagent)

(reduction by, of precious metal salts)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



● Na<sup>+</sup>

IT 7440-05-3D, salts 7440-06-4D, salts 7440-22-4D  
 , salts 7440-57-5D, salts  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (reduction of, by sodium tetrahydroborate)  
 RN 7440-05-3 HCAPLUS  
 CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCAPLUS  
 CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

RN 7440-22-4 HCAPLUS  
 CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

RN 7440-57-5 HCAPLUS  
 CN Gold (8CI, 9CI) (CA INDEX NAME)

Au

L28 ANSWER 8 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1972:493257 HCAPLUS

DOCUMENT NUMBER: 77:93257

TITLE: Catalysts formed by the reduction of Group VIII metal salts with sodium borohydride

AUTHOR(S): Sterlyadkina, Z. K.; Mal'tseva, N. N.; Frangulyan, G. D.; Polkovnikov, B. D.; Bakulina, V. M.

CORPORATE SOURCE: Inst. Org. Khim. im. Zelinskogo, Moscow, USSR

SOURCE: Izvestiya Akademii Nauk SSSR, Seriya Khimicheskaya (1972), (6), 1240-5

CODEN: IASKA6; ISSN: 0002-3353

DOCUMENT TYPE: Journal

LANGUAGE: Russian

AB The ppts. formed by reduction of  $\text{NiCl}_2$  and  $\text{CoCl}_2$  by  $\text{NaBH}_4$  contain the free metal and  $\text{M}_2\text{B}$  ( $\text{M} = \text{Co}, \text{Ni}$ ) after being heated in Ar at  $400^\circ$ . Similar reduction of  $\text{PdCl}_2$  and  $\text{H}_2\text{PtCl}_6$  leads to **Pt** and  $\alpha$ -**Pd**.

IT 7440-06-4P, uses and miscellaneous

RL: CAT (Catalyst use); **PREP (Preparation)**; USES (Uses)  
(catalysts, reduction of chloroplatinic acid by **sodium borohydride** in preparation of)

RN 7440-06-4 HCAPLUS

CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

IT 7440-05-3P, uses and miscellaneous

RL: CAT (Catalyst use); **PREP (Preparation)**; USES (Uses)  
(catalysts, reduction of **palladium** chloride by **sodium borohydride** in preparation of)

RN 7440-05-3 HCAPLUS

CN Palladium (8CI, 9CI) (CA INDEX NAME)

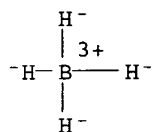
Pd

IT 16940-66-2

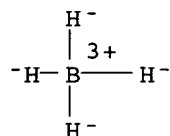
RL: **RCT (Reactant)**; **RACT (Reactant or reagent)**  
(reduction by, of Group VIII **metal** salts in catalyst preparation)

RN 16940-66-2 HCAPLUS

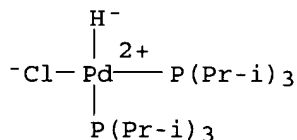
CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

●  $\text{Na}^+$

L28 ANSWER 9 OF 9 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1971:71098 HCAPLUS  
 DOCUMENT NUMBER: 74:71098  
 TITLE: Tertiary phosphine-hydride and -hydridoborohydride  
 compounds of nickel and **palladium**  
 AUTHOR(S): Green, Malcolm L. H.; Munakata, H.; Saito, Tato  
 CORPORATE SOURCE: Inorg. Chem. Lab., Oxford, UK  
 SOURCE: Journal of the Chemical Society [Section] A:  
 Inorganic, Physical, Theoretical (1971),  
 (3), 469-74  
 CODEN: JCSIAP; ISSN: 0022-4944  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB The isolation and properties of the complexes trans-(R13P)2M1H(BH4) and  
 trans-(R13P)2M2HX, where M1 = Ni or **Pd**; R1 = iso-Pr, cyclohexyl;  
 M2 = **Pd**; X = Cl, Br, I, or NCS, are described. Phosphine  
 exchange reactions of (R13P)2MHX with R23P, where R2 = Et, Pr, and Bu,  
 were studied by 1H NMR.  
 IT **16971-29-2DP, Borate(1-), tetrahydro-, Group VIII**  
**metal complexes 27900-91-0P 28016-71-9P**  
**28016-73-1P 30916-07-5P 31178-50-4P**  
**31178-51-5P**  
 RL: SPN (Synthetic preparation); **PREP (Preparation)**  
 (preparation of)  
 RN 16971-29-2 HCAPLUS  
 CN Borate(1-), tetrahydro- (8CI, 9CI) (CA INDEX NAME)

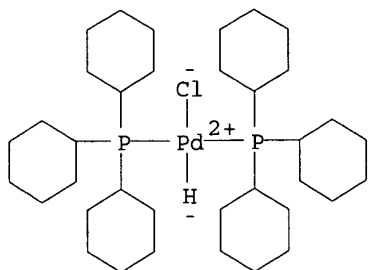


RN 27900-91-0 HCAPLUS  
 CN Palladium, chlorohydrobis[tris(1-methylethyl)phosphine]-, (SP-4-3)- (9CI)  
 (CA INDEX NAME)

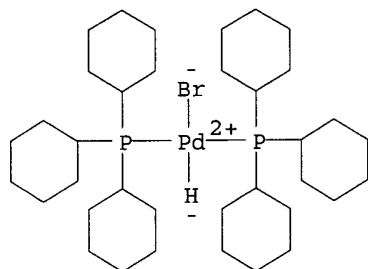


RN 28016-71-9 HCAPLUS  
 CN Palladium, chlorohydrobis(tricyclohexylphosphine)-, (SP-4-3)- (9CI) (CA  
 INDEX NAME)

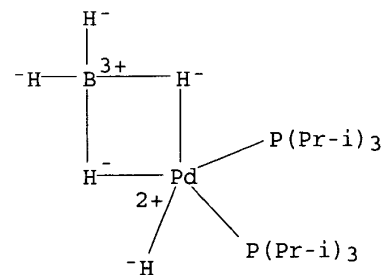
Valenrod 10\_721479



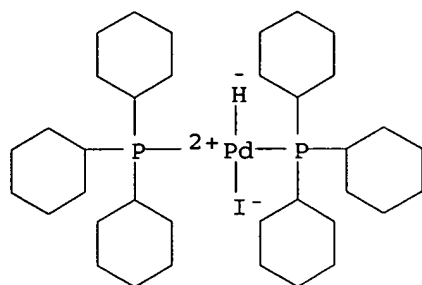
RN 28016-73-1 HCAPLUS  
CN Palladium, bromohydrobis(tricyclohexylphosphine)-, trans- (8CI) (CA INDEX NAME)



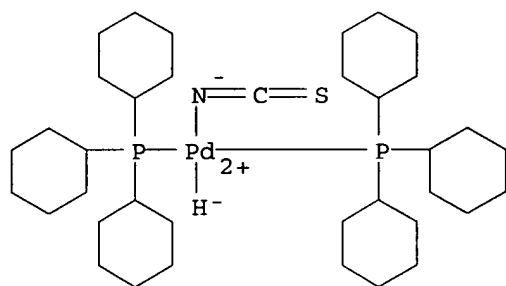
RN 30916-07-5 HCAPLUS  
CN Palladium, hydro[tetrahydroborate(1-)]bis(triisopropylphosphine)-, trans- (8CI) (CA INDEX NAME)



RN 31178-50-4 HCAPLUS  
CN Palladium, hydroiodobis(tricyclohexylphosphine)-, trans- (8CI) (CA INDEX NAME)

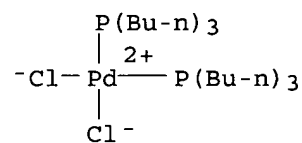


RN 31178-51-5 HCAPLUS  
 CN Palladium, hydro(isothiocyanato)bis(tricyclohexylphosphine)-, trans- (8CI)  
 (CA INDEX NAME)

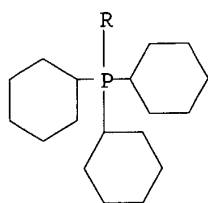
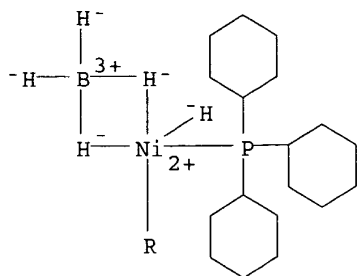


IT 17523-47-6 24899-12-5  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (redistribution reaction of, with Group VIII metal  
 trialkylphosphine complexes, NMR in relation to)

RN 17523-47-6 HCAPLUS  
 CN Palladium, dichlorobis(tributylphosphine)-, (SP-4-1)- (9CI) (CA INDEX NAME)



RN 24899-12-5 HCAPLUS  
 CN Nickel, hydro[tetrahydroborato(1-)-H,H']bis(tricyclohexylphosphine)-,  
 (TB-5-11)- (9CI) (CA INDEX NAME)

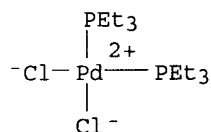


IT 15642-19-0

RL: RCT (Reactant); RACT (Reactant or reagent)  
(redistribution reaction of, with Group VIII metal  
tricyclohexylphosphine complexes, NMR in relation to)

RN 15642-19-0 HCAPLUS

CN Palladium, dichlorobis(triethylphosphine)-, (SP-4-1)- (9CI) (CA INDEX NAME)

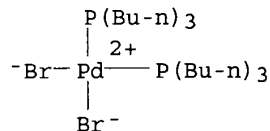


IT 17523-48-7

RL: RCT (Reactant); RACT (Reactant or reagent)  
(redistribution reaction of, with nickel tricyclohexylphosphine  
complexes, NMR in relation to)

RN 17523-48-7 HCAPLUS

CN Palladium, dibromobis(tributylphosphine)-, trans- (8CI) (CA INDEX NAME)



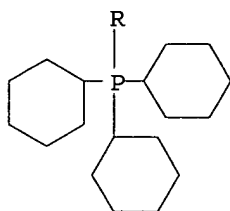
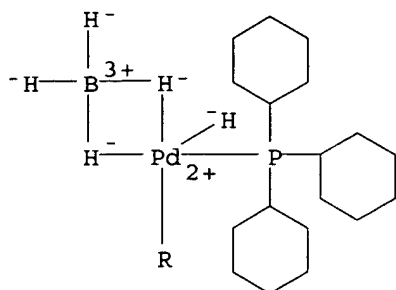
IT 30916-06-4

RL: RCT (Reactant); RACT (Reactant or reagent)  
(redistribution reaction of, with palladium trialkyl  
phosphine complexes, NMR in relation to)

RN 30916-06-4 HCAPLUS



CN Palladium, hydro[tetrahydroborato(1-)-H,H']bis(tricyclohexylphosphine)-, (TB-5-11)- (9CI) (CA INDEX NAME)

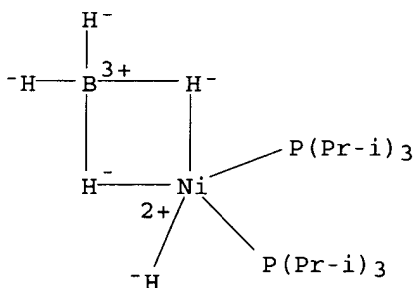


IT 31095-23-5

RL: RCT (Reactant); RACT (Reactant or reagent)  
(redistribution reaction of, with palladium tributyl phosphine complexes, NMR in relation to)

RN 31095-23-5 HCAPLUS

CN Nickel, hydro[tetrahydroborato(1-)-H,H']bis[tris(1-methylethyl)phosphine]-, (TB-5-11)- (9CI) (CA INDEX NAME)



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L1 795 SEA FILE=REGISTRY ABB=ON PLU=ON TETRAHYDROBORATE OR HYDROBORA  
TE  
L2 11 SEA FILE=REGISTRY ABB=ON PLU=ON SODIUM BOROHYDRATE?/CN OR  
LITHIUM BOROHYDR?/CN OR POTASSIUM BOROHYDR?/CN  
L3 104214 SEA FILE=REGISTRY ABB=ON PLU=ON METAL OR METALS OR MAGNESIUM  
  
L4 128483 SEA FILE=REGISTRY ABB=ON PLU=ON BORATE  
L5 15523 SEA FILE=HCAPLUS ABB=ON PLU=ON L1 OR TETRAHYDROBORATE OR  
HYDROBORATE  
L6 SEL PLU=ON L2 1- CHEM : 52 TERMS  
L7 15422 SEA FILE=HCAPLUS ABB=ON PLU=ON L6  
L8 15583 SEA FILE=HCAPLUS ABB=ON PLU=ON L7 OR (SODIUM OR LITHIUM OR  
POTASSIUM) (2A) BOROHYDR?  
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L10 166954 SEA FILE=HCAPLUS ABB=ON PLU=ON L4 OR BORATE  
L12 15254 SEA FILE=HCAPLUS ABB=ON PLU=ON L10 (L) L9  
L14 38473 SEA FILE=HCAPLUS ABB=ON PLU=ON L10 (L) (RCT/RL OR RACT/RL)  
L15 250013 SEA FILE=HCAPLUS ABB=ON PLU=ON L9 (L) (RCT/RL OR RACT/RL)  
L16 2579 SEA FILE=HCAPLUS ABB=ON PLU=ON L12 AND L14  
L17 1952 SEA FILE=HCAPLUS ABB=ON PLU=ON L16 AND L15  
L18 104576 SEA FILE=REGISTRY ABB=ON PLU=ON PALLADIUM/BI  
L19 208 SEA FILE=REGISTRY ABB=ON PLU=ON PT/MF  
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PLATINUM OR PD OR PT  
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L26 78 SEA FILE=HCAPLUS ABB=ON PLU=ON L17 AND L25  
L27 11 SEA FILE=HCAPLUS ABB=ON PLU=ON L26 AND L21  
L28 9 SEA FILE=HCAPLUS ABB=ON PLU=ON L27 AND PD=<NOVEMBER 25, 2003  
  
L29 2 SEA FILE=HCAPLUS ABB=ON PLU=ON L27 NOT L28

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L29 ANSWER 1 OF 2 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2004:676920 HCAPLUS

DOCUMENT NUMBER: 142:6582

TITLE: Hydrocarbon C-H bond activation with Tp'**Pt** complexes

AUTHOR(S): Norris, Cynthia M.; Templeton, Joseph L.

CORPORATE SOURCE: Department of Chemistry, University of North Carolina, Chapel Hill, NC, 27599-3290, USA

SOURCE: ACS Symposium Series (2004), 885(Activation and Functionalization of C-H Bonds), 303-318  
CODEN: ACSMC8; ISSN: 0097-6156

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal; General Review

LANGUAGE: English

AB A review. Stabilization of **Pt** complexes resembling key intermediates in C-H bond activation has been achieved through the use of the strongly electron-donating hydridotris(3,5-dimethyl-1H-pyrazol-1-yl)borate (Tp') ligand. Isolation of stable alkyl(hydrido) **platinum**(IV) complexes, Tp'**Pt**Me<sub>2</sub>H and Tp'**Pt**MeH<sub>2</sub>, allowed the authors to study the mechanism of reductive alkane elimination from these complexes via (1) thermolysis, (2) Lewis acid addition, and (3) low temperature protonation. By replacing the alkyl group with SiR<sub>3</sub> and C<sub>6</sub>R<sub>5</sub> in the low temperature protonation of Tp'**Pt**RH<sub>2</sub>, isolation of five-coordinate **Pt**(IV) complexes and **Pt**(II)  $\eta^2$ -arene adducts, resp., was achieved. These **Pt**(II)/**Pt**(IV) interconversions provide insight into the mechanisms by which these reagents activate strong C-H bonds and also provide a foundation for future plans to functionalize hydrocarbons.

IT 7440-06-4DP, **Platinum**, hydridotris(3,5-dimethylpyrazol-1-yl)borate complexes 83534-02-5DP, Hydridotris(3,5-dimethylpyrazol-1-yl)borate, **platinum** complexes  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); **RCT** (**Reactant**); SPN (Synthetic preparation); **PREP** (**Preparation**); PROC (Process); **RACT** (**Reactant or reagent**) (hydrocarbon carbon-hydrogen bond activation with **platinum** hydridotripyrazolylborato complexes)

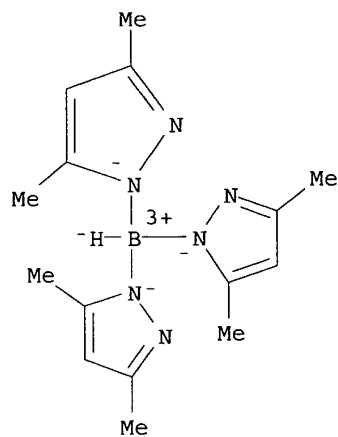
RN 7440-06-4 HCAPLUS

CN **Platinum** (8CI, 9CI) (CA INDEX NAME)**Pt**

RN 83534-02-5 HCAPLUS

CN Borate(1-), tris(3,5-dimethyl-1H-pyrazolato- $\kappa$ N1)hydro-, (T-4)- (9CI)  
(CA INDEX NAME)

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REFERENCE COUNT:

91

THERE ARE 91 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

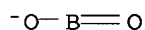
L29 ANSWER 2 OF 2 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2004:651206 HCAPLUS  
 DOCUMENT NUMBER: 141:192634  
 TITLE: method to produce tetrahydroborate salts  
 INVENTOR(S): Suda, Seijiro; Li, Chou-Peng; Iwase, Yasuyoshi;  
 Morigasaki, Nobuto  
 PATENT ASSIGNEE(S): Materials & Energy Research Institute Tokyo, Ltd.  
 MERIT., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 9 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2004224593	A2	20040812	JP 2003-11299	20030120
PRIORITY APPLN. INFO.:			JP 2003-11299	20030120

AB The method includes hydriding reaction of alkali or alkaline earth metal meta-borate by supplying mixed gas of O<sub>2</sub>-accepting gas (e.g. CO, C<sub>5</sub> hydrocarbons), H<sub>2</sub>, and O<sub>2</sub> with a hydriding catalyst selected from ≥1 of Ni, Co, Fe, Pt, Cu, Pd, Ru, and Rh. The borate raw material is obtained from spent fuel cells. The method enhances the hydriding reaction under mild conditions, and produces NaBH<sub>4</sub>, LiBH<sub>4</sub>, and KBH<sub>4</sub> in low operation costs.

IT 14100-65-3, Meta-borate  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (alkali metal salt, alkaline metal salt; method to produce tetrahydroborate salts)

RN 14100-65-3 HCAPLUS  
 CN Borate (BO21-) (8CI, 9CI) (CA INDEX NAME)



IT 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (method to produce tetrahydroborate salts)

RN 7440-05-3 HCAPLUS  
 CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCAPLUS  
 CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

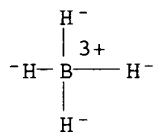
IT 13762-51-1P, Potassium Tetrahydroborate  
 16940-66-2P, Sodium Tetrahydroborate  
 16949-15-8P, Lithium Tetrahydroborate  
 RL: PUR (Purification or recovery); PREP (Preparation)

Valenrod 10\_721479

(method to produce **tetrahydroborate** salts)

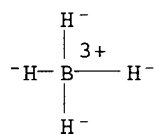
RN 13762-51-1 HCAPLUS

CN Borate(1-), tetrahydro-, potassium (8CI, 9CI) (CA INDEX NAME)



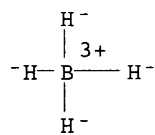
RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



RN 16949-15-8 HCAPLUS

CN Borate(1-), tetrahydro-, lithium (8CI, 9CI) (CA INDEX NAME)



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L1      795 SEA FILE=REGISTRY ABB=ON  PLU=ON  TETRAHYDROBORATE OR HYDROBORA
        TE
L2      11 SEA FILE=REGISTRY ABB=ON  PLU=ON  SODIUM BOROHYDRATE?/CN OR
        LITHIUM BOROHYDR?/CN OR POTASSIUM BOROHYDR?/CN
L3     104214 SEA FILE=REGISTRY ABB=ON  PLU=ON  METAL OR METALS OR MAGNESIUM

L4     128483 SEA FILE=REGISTRY ABB=ON  PLU=ON  BORATE
L5     15523 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L1 OR TETRAHYDROBORATE OR
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L6      SEL  PLU=ON  L2 1- CHEM :      52 TERMS
L7     15422 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L6
L8     15583 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L7 OR (SODIUM OR LITHIUM OR
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L9     4137887 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L3 OR METAL OR MAGNESIUM
L10    166954 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L4 OR BORATE
L12    15254 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L10(L) L9
L14    38473 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L10(L) (RCT/RL OR RACT/RL)
L15    250013 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L9(L) (RCT/RL OR RACT/RL)
L16    2579 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L12 AND L14
L17    1952 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L16 AND L15
L18    104576 SEA FILE=REGISTRY ABB=ON  PLU=ON  PALLADIUM/BI
L19    208 SEA FILE=REGISTRY ABB=ON  PLU=ON  PT/MF
L21    513099 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L18 OR L19 OR PALLADIUM OR
        PLATINUM OR PD OR PT
L25    3041 SEA FILE=HCAPLUS ABB=ON  PLU=ON  (L5 OR L8) (L) (PREP?/RL OR
        PREP OR PREPARTION)
L26    78 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L17 AND L25
L27    11 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L26 AND L21
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L30    524 SEA FILE=HCAPLUS ABB=ON  PLU=ON  (L5 OR L8) (L) (PURIFI?/RL OR
        PURIFI? OR RECOVER?)
L31    152 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L30 AND L10 AND L9
L32    38 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L31 AND L9 AND L21
L33    36 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L32 NOT (L27 OR L28)

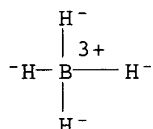
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L33 ANSWER 1 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2005:652766 HCAPLUS  
 DOCUMENT NUMBER: 144:153746  
 TITLE: Recovery of **platinum** from spent catalysts  
 from catalytic reforming unit using the Gemini process  
 AUTHOR(S): Soltan-Mohammadzadeh, Jafar-Sadeg; Fatehifar, Esmaeel;  
 Hamed, Hassan  
 CORPORATE SOURCE: Chem. Engineering, Sahand Technical University,  
 Tabriz, Iran  
 SOURCE: Iranian National Chemical Engineering Congress, 8th,  
 Mashhad, Islamic Republic of Iran, Oct. 19-21, 2003  
 (2003), 227/1-227/11. Danishgah-i Ferdowsi Mashhad,  
 Danishkada Muhandisi: Mashhad, Iran.  
 CODEN: 69GMYP  
 DOCUMENT TYPE: Conference; (computer optical disk)  
 LANGUAGE: Persian  
 AB Studies were carried out to optimize the conditions for the solubilization  
 of base catalyst alumina and concentration and separation of **Pt** using formic  
 acid and NaBH<sub>4</sub>. **Pt** recovery amounted to 94.1% with formic acid  
 and 95.68% with NaBH<sub>4</sub>.  
 IT **16940-66-2, Sodium borohydride**  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (recovery of **platinum** from spent catalysts from  
 catalytic reforming unit using Gemini process)  
 RN 16940-66-2 HCAPLUS  
 CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



IT **7440-06-4P, Platinum, preparation**  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (recovery of **platinum** from spent catalysts from catalytic  
 reforming unit using Gemini process)  
 RN 7440-06-4 HCAPLUS  
 CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt



L33 ANSWER 2 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2005:395865 HCAPLUS  
 DOCUMENT NUMBER: 142:396971  
 TITLE: Process for removal of heavy **metal** ions from  
 wastewater using reducing agent composition  
 INVENTOR(S): Covaliov, Victor; Covaliova, Olga; Duca, Gheorghe  
 PATENT ASSIGNEE(S): Universitatea de Stat din Moldova, Moldova  
 SOURCE: Mold. Unexam. Pat. Appl., 7 pp.  
 CODEN: MDXXAX  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Romanian  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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MD 990123	A	20001130	MD 1999-123	19990317
MD 1649	F2	20010430		

PRIORITY APPLN. INFO.: MD 1999-123 19990317

AB The invention refers to processes for **purification** of sewage from.  
 Heavy **metal** ions are removed from wastewater using a chemical  
 reducing agent composition containing **sodium borohydride**  
 0.05-0.06, sodium hypophosphite 0.25-0.30, formaldehyde 0.60-0.70, and  
 hydrazine 0.30-0.40 mol/L at pH 6-8. The process is realized in a flow at  
 the linear velocity of 0.2-0.3 m/min in an electromagnetic field at a  
 voltage of 20-30 W/dm<sup>3</sup> and frequency of 60-74 kHz on the catalyst surface.  
 A nickel-zinc alloy is used as catalyst and is coated by electrochem.  
 deposition onto a steel grill with the cell dimension of 0.5-2.0 mm. The  
 solution is added so that the weight ratio to the total heavy **metal**  
 ions content is (1.5-2.0):1. Use of this composition results in increased  
 sewage **purification** degree and decreased material and power  
 consumption for the **purification** process.

IT 7440-02-0, Nickel, processes 7440-05-3,  
**Palladium**, processes 7440-22-4, Silver, processes  
 7440-50-8, Copper, processes 7440-66-6, Zinc, processes  
 RL: REM (Removal or disposal); PROC (Process)  
 (removal of heavy **metal** ions from wastewater using reducing  
 agent composition)

RN 7440-02-0 HCAPLUS  
 CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

RN 7440-05-3 HCAPLUS  
 CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-22-4 HCAPLUS  
 CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

RN 7440-50-8 HCAPLUS

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CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

RN 7440-66-6 HCAPLUS

CN Zinc (7CI, 8CI, 9CI) (CA INDEX NAME)

Zn

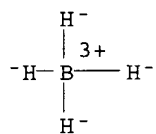
IT 16940-66-2, Sodium borohydride

RL: NUU (Other use, unclassified); USES (Uses)

(removal of heavy **metal** ions from wastewater using reducing agent composition containing)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



● Na<sup>+</sup>

L33 ANSWER 3 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2004:780106 HCAPLUS

DOCUMENT NUMBER: 141:245652

TITLE: Production and purification of hydrogen

INVENTOR(S): Ring, Terry A.; Freise, William; Maylett, Brett;  
Fisher, Matthew

PATENT ASSIGNEE(S): USA

SOURCE: U.S. Pat. Appl. Publ., 8 pp.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 2004184987	A1	20040923	US 2003-384961	20030310
PRIORITY APPLN. INFO.:			US 2003-384961	20030310

AB Highly pure hydrogen gas is produced by reaction of Na, NaH, NaAlH<sub>4</sub>, NaBH<sub>4</sub>, Li, LiH, or LiBH<sub>4</sub> with water and subsequent purification of the hydrogen using a hydrogen-selective **metal** membrane. The membrane can consist of **Pd**, Ta, V, Nb, Y, Th, Zr, or Ti. The membrane is supported by a rigid porous structural support.

IT **7440-05-3, Palladium**, uses **7440-32-6**, Titanium, uses  
 RL: DEV (Device component use); USES (Uses)  
 (membrane; production and purification of hydrogen)

RN 7440-05-3 HCAPLUS

CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-32-6 HCAPLUS

CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

IT **7440-23-5, Sodium**, reactions **16940-66-2, Sodium borohydride (NaBH<sub>4</sub>)** **16949-15-8, Lithium borohydride (LiBH<sub>4</sub>)**  
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); RCT (Reactant); PROC (Process); RACT (Reactant or reagent)  
 (production and **purification** of hydrogen)

RN 7440-23-5 HCAPLUS

CN Sodium (8CI, 9CI) (CA INDEX NAME)

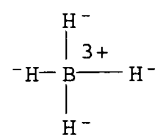
Na

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

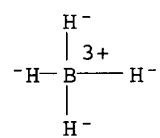
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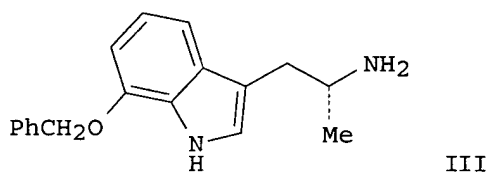
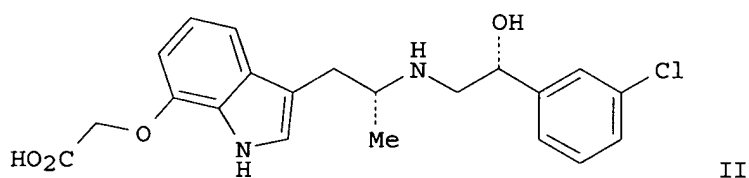
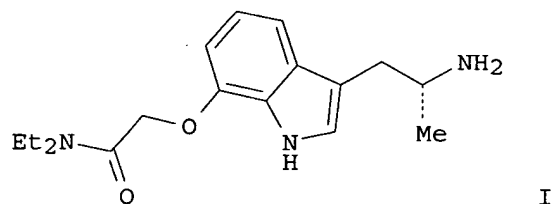


RN 16949-15-8 HCAPLUS

CN Borate(1-), tetrahydro-, lithium (8CI, 9CI) (CA INDEX NAME)



L33 ANSWER 4 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2004:112383 HCAPLUS  
 DOCUMENT NUMBER: 140:321195  
 TITLE: Process Development of a Scaleable Route to  
 (2R)-[3-(2-Aminopropyl)-1H-indol-7-yloxy]-N,N-  
 diethylacetamide: A Key Intermediate for AJ-9677, a  
 Potent and Selective Human and Rat  $\beta$ 3-Adrenergic  
 Receptor Agonist  
 AUTHOR(S): Harada, Hiroshi; Fujii, Akihito; Odai, Osamu; Kato,  
 Shiro  
 CORPORATE SOURCE: Chemistry Research Laboratories, Dainippon  
 Pharmaceutical Co., Ltd., Suita, Osaka, 564-0053,  
 Japan  
 SOURCE: Organic Process Research & Development (2004), 8(2),  
 238-245  
 CODEN: OPRDFK; ISSN: 1083-6160  
 PUBLISHER: American Chemical Society  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 OTHER SOURCE(S): CASREACT 140:321195  
 GI



AB Nonracemic (aminopropylindoleoxy)acetamide I, an intermediate in the preparation of  $\beta$ 3-adrenergic receptor agonist AJ-9677 II, is prepared in five steps and 43% overall yield from 7-benzyloxy-1H-indole without chromatog. **purification** The key step in the preparation of I is a regioselective and stereoselective acylation of 7-benzyloxy-1H-indole with N-Fmoc-D-alaninyl chloride; reduction of the acylindole intermediate with

sodium borohydride in a mixture of acetonitrile and isopropanol, and salt formation yields the nonracemic 1:1 oxalate salt of III. Protection of the terminal amine with Boc anhydride, a one-step debenzoylation and alkylation using hydrogenation with **palladium** on carbon followed by alkylation of the phenol with N,N-di-Et chloroacetamide, removal of the Boc group with oxalic acid and treatment of the crystalline oxalate salt with potassium carbonate yields I. Deprotonation of 7-benzyloxy-1H-indole using methylmagnesium bromide is more effective than deprotonation with other Me Grignard reagents. N-Fmoc-D-alaninyl chloride is a more effective reagent in the preparation of I than other N-protected D-alaninyl chlorides; N-Cbz-D-alaninyl chloride does not react with the anion generated from 7-benzyloxy-1H-indole and methylmagnesium bromide, a phthaloyl-protected alaninyl chloride reacts but yields an acylindole which could not be reduced, and N-trifluoroacetyl-D-alaninyl chloride gives a lower yield in the acylation step. Reduction with **sodium borohydride** gives better results than other reducing agents such as **lithium borohydride**, borane-THF, and Vitride in the reduction of the acylindole intermediate in the preparation of I; using a mixed solvent system of acetonitrile and isopropanol gives better results than the use of either an alc. solvent alone or the use of other alcs. such as ethanol as cosolvents with acetonitrile. Oxalic acid salts of the aminopropylindole and the aminopropylindoleoxyacetamide intermediates in the preparation of I are crystalline, while salts with other inorg. and organic acids tried are amorphous.

Alkylation of the penultimate phenol intermediate with chloroacetic acid esters gives lactam products rather than the desired aminopropylindoleoxyacetate esters.

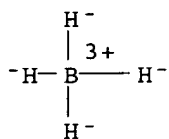
- IT 676-58-4, Methylmagnesium chloride 917-64-6,  
Methylmagnesium iodide  
RL: RGT (Reagent); RACT (Reactant or reagent)  
(less effective methylmagnesium halide reagent for the deprotonation of 7-benzyloxyindole in the regioselective acylation with N-protected D-alaninyl chlorides for the synthesis of the  $\beta$ 3-adrenergic receptor agonist AJ-9677)
- RN 676-58-4 HCAPLUS  
CN Magnesium, chloromethyl- (7CI, 8CI, 9CI) (CA INDEX NAME)

H<sub>3</sub>C-Mg-Cl

- RN 917-64-6 HCAPLUS  
CN Magnesium, iodomethyl- (7CI, 8CI, 9CI) (CA INDEX NAME)

H<sub>3</sub>C-Mg-I

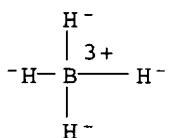
- IT 16949-15-8, Lithium borohydride  
RL: RGT (Reagent); RACT (Reactant or reagent)  
(less effective reducing agent tried in the reduction of a nonracemic 3-acylindole in the preparation of an (aminopropylindoleoxy)acetamide intermediate for the synthesis of the  $\beta$ 3-adrenergic receptor agonist AJ-9677)
- RN 16949-15-8 HCAPLUS  
CN Borate(1-), tetrahydro-, lithium (8CI, 9CI) (CA INDEX NAME)

● Li<sup>+</sup>

IT 75-16-1, Methylmagnesium bromide  
 RL: RGT (Reagent); RACT (Reactant or reagent)  
 (optimal methylmagnesium halide reagent for the deprotonation of  
 7-benzyloxyindole in the regioselective acylation with N-protected  
 D-alaninyl chlorides for the synthesis of the  $\beta$ 3-adrenergic  
 receptor agonist AJ-9677)  
 RN 75-16-1 HCAPLUS  
 CN Magnesium, bromomethyl- (8CI, 9CI) (CA INDEX NAME)



IT 16940-66-2, Sodium borohydride  
 RL: RGT (Reagent); RACT (Reactant or reagent)  
 (optimal reducing agent tried in the reduction of a nonracemic 3-acylindole  
 in the preparation of an (aminopropylindoleoxy)acetamide intermediate for  
 the synthesis of the  $\beta$ 3-adrenergic receptor agonist AJ-9677)  
 RN 16940-66-2 HCAPLUS  
 CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

● Na<sup>+</sup>

REFERENCE COUNT: 19 THERE ARE 19 CITED REFERENCES AVAILABLE FOR THIS  
 RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L33 ANSWER 5 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2003:767751 HCAPLUS

DOCUMENT NUMBER: 139:276637

TITLE: Purification of ethylenic compounds having fluorinated organic group

INVENTOR(S): Matsuda, Takashi; Koike, Noriyuki; Oyama, Masayuki

PATENT ASSIGNEE(S): Shin-Etsu Chemical Industry Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 5 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2003277304	A2	20031002	JP 2002-75785	20020319
PRIORITY APPLN. INFO.:			JP 2002-75785	20020319

OTHER SOURCE(S): MARPAT 139:276637

AB Rf(CH:CH<sub>2</sub>)<sub>n</sub> (Rf= mono- or divalent F-containing organic group; n = 1, 2) are purified by treating with ≥1 selected from **metal** hydrides and **metal**-hydrogen complex compds. to eliminate I from iodine compds. contained as impurities and other components which interfere Pt-catalyzed hydrosilylation reaction. A mixture of C<sub>4</sub>F<sub>9</sub>CH<sub>2</sub>CH<sub>2</sub> (I; 100 g, I<sub>2</sub> content 105 ppm), NaBH<sub>4</sub>, NaOH solution, and Me<sub>2</sub>CHOH was stirred at 60° for 1 h to give 97 g I containing ≤1 ppm I<sub>2</sub>. The purified I was treated with MeSiHCl<sub>2</sub> in Me<sub>2</sub>CHOH containing H<sub>2</sub>PtCl<sub>6</sub> at 150° for 18 h to show conversion 98.2%.

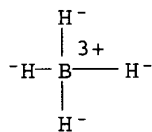
IT 16940-66-2, Sodium borohydride

RL: RGT (Reagent); RACT (Reactant or reagent)

(**purification** of F-containing ethylenic compds. by eliminating I from impurity iodides using **metal** hydrides or **metal**-hydrogen complexes)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

● Na<sup>+</sup>



L33 ANSWER 6 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2003:673831 HCAPLUS

DOCUMENT NUMBER: 139:179794

TITLE: Method for purification of methylal containing peroxides

INVENTOR(S): Omori, Hideki; Shoji, Hiroshi; Nakamura, Tomizo

PATENT ASSIGNEE(S): Maruzen Oil Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 4 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2003238471	A2	20030827	JP 2002-34153	20020212
PRIORITY APPLN. INFO.:			JP 2002-34153	20020212

AB The method includes reduction of methylal (I) containing peroxides and adsorption of the reduced products to remove HCO<sub>2</sub>H (II). Thus, I containing 180 ppm peroxide was hydrogenolyzed over Raney Ni to give a product (peroxide content <2 ppm, II content 60 ppm), which was treated with Mol. Sieve 4A, showing II content <1 ppm.

IT 1318-93-0, Montmorillonite, uses  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (adsorbent; purification of methylal containing peroxides by reduction and adsorption)

RN 1318-93-0 HCAPLUS

CN Montmorillonite ((Al<sub>1.33</sub>-1.67Mg<sub>0.33</sub>-0.67)(Ca<sub>0</sub>-1Na<sub>0</sub>-1)0.33Si<sub>4</sub>(OH)2010.xH<sub>2</sub>O) (9CI) (CA INDEX NAME)

\*\*\* STRUCTURE DIAGRAM IS NOT AVAILABLE \*\*\*

IT 1344-28-1, Alumina, uses  
 RL: CAT (Catalyst use); NUU (Other use, unclassified); USES (Uses)  
 (hydrogenolysis catalyst support and adsorbent; purification of methylal containing peroxides by reduction and adsorption)

RN 1344-28-1 HCAPLUS

CN Aluminum oxide (Al<sub>2</sub>O<sub>3</sub>) (8CI, 9CI) (CA INDEX NAME)

\*\*\* STRUCTURE DIAGRAM IS NOT AVAILABLE \*\*\*

IT 7440-02-0, Raney nickel, uses 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (hydrogenolysis catalyst; purification of methylal containing peroxides by reduction and adsorption)

RN 7440-02-0 HCAPLUS

CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

RN 7440-05-3 HCAPLUS

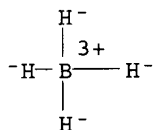
CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCAPLUS  
CN Platinum (8CI, 9CI) (CA INDEX NAME)

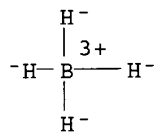
Pt

IT **16940-66-2, Sodium borohydride**  
**16971-29-2D**, Borohydride, trimethoxy-, salts **33195-00-5D**  
, Cyanoborohydride, salts  
RL: RGT (Reagent); RACT (Reactant or reagent)  
(reducing agent; **purification** of methylal containing peroxides by  
reduction and adsorption)  
RN 16940-66-2 HCAPLUS  
CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

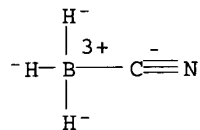


● Na<sup>+</sup>

RN 16971-29-2 HCAPLUS  
CN Borate(1-), tetrahydro- (8CI, 9CI) (CA INDEX NAME)



RN 33195-00-5 HCAPLUS  
CN Borate(1-), (cyano-κC)trihydro-, (T-4)- (9CI) (CA INDEX NAME)



L33 ANSWER 7 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2003:22609 HCAPLUS  
 DOCUMENT NUMBER: 138:94840  
 TITLE: Extraction and recovery of ions from a solution  
 INVENTOR(S): Strauss, Steven H.; Odom, Matthew A.; Clapsaddle, Brady  
 PATENT ASSIGNEE(S): Colorado State University Research Foundation, USA  
 SOURCE: PCT Int. Appl., 32 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003001895	A2	20030109	WO 2002-US20973	20020627
WO 2003001895	A3	20030227		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
US 2005145571	A1	20050707	US 2003-501884	20020627
PRIORITY APPLN. INFO.:			US 2001-302052P	P 20010629
			WO 2002-US20973	W 20020627

AB The present invention provides organometallic redox-recyclable solid ion-extractant and a method for using the same in extracting and recovering perfluoroalkyl carboxylate or perfluoroalkyl sulfonate ions in a solution. The solid ion extractant is a composition of the formula [ZX<sub>1</sub>Si(X<sub>2</sub>R<sub>2</sub>)(X<sub>3</sub>R<sub>3</sub>)R<sub>1</sub>Ar<sub>1</sub>Mar<sub>2</sub>]Y<sub>a</sub>, wherein: each of Ar<sub>1</sub> and Ar<sub>2</sub> is independently C<sub>4</sub>-C<sub>20</sub> aryl selected from the group consisting of cyclopentadienyl, dicarbollide and Ph, each of which can be optionally substituted; M is a transition metal is selected from Fe, Ru, Mn, Co, Ni, Cr, Os, Rh and Ir; R<sub>1</sub> is C<sub>2</sub>-C<sub>20</sub> alkylene; each of X<sub>1</sub>, X<sub>2</sub> and X<sub>3</sub> is independently a bond, O, S, or NR<sub>4</sub>; each of R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub> is independently H, or C<sub>1</sub>-C<sub>6</sub> alkyl; Z is a solid support selected from glass, metal or a polymeric resin; Y is an anion selected from NO<sub>3</sub><sup>-</sup>, halide, HSO<sub>4</sub><sup>-</sup>, ClO<sub>4</sub><sup>-</sup>, ReO<sub>4</sub><sup>-</sup>, PF<sub>6</sub><sup>-</sup>, carboxylate and CF<sub>3</sub>SO<sub>3</sub><sup>-</sup>; and a is 0 when said ion coordinating agent is deactivated, and a is an integer from 1-3 when said ion coordinating agent is activated. In particular, the present invention provides a method for extracting and recovering ions which are relatively insol. in a solvent at a particular solvent temperature range. More specifically, the present invention provides a method for extracting and recovering perfluoroalkylsulfonates from an aqueous solution, such as wastewaters from firefighting.

IT 7440-06-4D, Platinum, silyl compds., complexes of  
 RL: CAT (Catalyst use); USES (Uses)  
 (hydrosilylation catalyst; preparation and use of a recyclable solid extractant for extraction and recovery of perfluoroalkyl carboxylate or perfluoroalkyl sulfonate ions from wastewater or other aqueous solns.)  
 RN 7440-06-4 HCAPLUS  
 CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

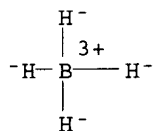
IT 16940-66-2, **Sodium borohydride**

RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)

(reductant to deactivate extractant; preparation and use of a recyclable solid extractant for extraction and **recovery** of perfluoroalkyl carboxylate or perfluoroalkyl sulfonate ions from wastewater or other aqueous solns.)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



● Na<sup>+</sup>

L33 ANSWER 8 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2002:827745 HCAPLUS  
 DOCUMENT NUMBER: 137:341465  
 TITLE: Method and apparatus for generation of clean air moist  
 for indoor air purification  
 INVENTOR(S): Suda, Seijiro  
 PATENT ASSIGNEE(S): Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 6 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002317980	A2	20021031	JP 2001-117286	20010416
PRIORITY APPLN. INFO.:			JP 2001-117286	20010416

AB The method is carried out by contacting alkaline aqueous solution containing **metal**-hydrogen complex compound (e.g., NaBH<sub>4</sub>) with H<sub>2</sub>-generation catalyst (e.g., fluorinated Ni-alloy) to form H<sub>2</sub> gas, then mixing the H<sub>2</sub> with O<sub>2</sub>-excess gas (e.g., air) in the presence of oxidation catalyst (e.g., Pd) for low-temperature combustion to produce air having water content, to be supplied to the indoor air via a pipeline.

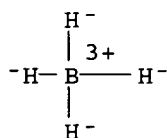
IT **7440-05-3, Palladium**, uses  
 RL: CAT (Catalyst use); DEV (Device component use); NUU (Other use, unclassified); USES (Uses)  
 (method and apparatus for generation of clean air moist for indoor air purification)

RN 7440-05-3 HCAPLUS  
 CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

IT **16940-66-2, Sodium borohydride** (NaBH<sub>4</sub>)  
 RL: NUU (Other use, unclassified); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)  
 (method and apparatus for generation of clean air moist for indoor air purification)

RN 16940-66-2 HCAPLUS  
 CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

● Na<sup>+</sup>

Valenrod 10\_721479

L33 ANSWER 9 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2002:638003 HCAPLUS

DOCUMENT NUMBER: 137:188572

TITLE: Acidic redox leaching for recovery of precious  
**metals** from low-concentration sources

INVENTOR(S): Farone, William A.; Azad, Maryam H.

PATENT ASSIGNEE(S): USA

SOURCE: U.S. Pat. Appl. Publ., 11 pp.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2002112569	A1	20020822	US 2001-789270	20010220
US 6551378	B2	20030422		

PRIORITY APPLN. INFO.: US 2001-789270 20010220

AB The Au and **Pt**-group **metals** in powdered low-concentrate sources  
(especially ore tailings) are recovered by leaching with aqueous solution  
containing HCl

and an oxidizing agent (typically Cl<sub>2</sub>), followed by separation of the leach  
solution, extraction of the associated base **metals**, and reduction with  
precipitation of

the precious **metals** for recovery. The residual solids from  
acidic leaching are neutralized with a base, and most of the base  
**metals** are precipitated as hydroxides. The process is environmentally  
acceptable, uses no organic solvents, and is suitable for leaching of ore  
tailings and wastes containing ppm amts. of precious **metals**.

IT 7440-06-4, **Platinum**, processes 7440-57-5,

Gold, processes

RL: EPR (Engineering process); PEP (Physical, engineering or chemical  
process); PROC (Process)

(leaching of; acidic redox leaching for recovery of precious  
**metals** from low-concentration sources)

RN 7440-06-4 HCAPLUS

CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

RN 7440-57-5 HCAPLUS

CN Gold (8CI, 9CI) (CA INDEX NAME)

Au

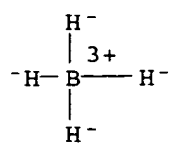
IT 16940-66-2, **Sodium borohydride**

RL: CPS (Chemical process); PEP (Physical, engineering or chemical  
process); PROC (Process)

(reduction with, in leach solution; acidic redox leaching for **recovery**  
of precious **metals** from low-concentration sources)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



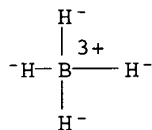
L33 ANSWER 10 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2001:91311 HCAPLUS  
 DOCUMENT NUMBER: 134:118619  
 TITLE: Method for recovery of **palladium** from spent catalyst solution for electroless coating  
 INVENTOR(S): Nakamura, Tomonobu; Tsuchida, Kazunori  
 PATENT ASSIGNEE(S): Matsuda Sangyo K. K., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 7 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2001032025	A2	20010206	JP 1999-204878	19990719
PRIORITY APPLN. INFO.:			JP 1999-204878	19990719

AB The method comprises reducing with Na borohydride.  
 IT **7440-05-3P, Palladium**, preparation  
 RL: **PUR (Purification or recovery)**; PREP (Preparation)  
 (**recovery of palladium** from spent catalyst solution for electroless coating by reducing with **sodium borohydride**)  
 RN 7440-05-3 HCAPLUS  
 CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

IT **16940-66-2, Sodium borohydride**  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (**recovery of palladium** from spent catalyst solution for electroless coating by reducing with **sodium borohydride**)  
 RN 16940-66-2 HCAPLUS  
 CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

● Na<sup>+</sup>

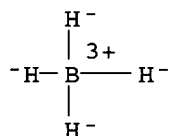


L33 ANSWER 11 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1998:42117 HCAPLUS  
 DOCUMENT NUMBER: 128:104629  
 TITLE: Method for recovery of **palladium** from spent catalysts  
 INVENTOR(S): Nakazawa, Hiroyuki  
 PATENT ASSIGNEE(S): Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 3 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 10008155	A2	19980113	JP 1996-192651	19960619
PRIORITY APPLN. INFO.:			JP 1996-192651	19960619
AB The method comprises dissolving a spent catalyst with aqua regia, precipitating the dissolved <b>Pd</b> as iodide for separation, and reducing the iodide with a reducing agent selected from NaBH <sub>4</sub> , hydrazine hydrochloride, hydrazine sulfate, hydrazine, Na <sub>2</sub> SO <sub>3</sub> , Na <sub>2</sub> S <sub>2</sub> O <sub>6</sub> , formic acid, oxalic acid.				
IT <b>7440-05-3P, Palladium</b> , preparation				
RL: PUR (Purification or recovery); PREP (Preparation) (recovery of <b>palladium</b> from spent catalysts by separation as iodide and reduction)				
RN	7440-05-3 HCAPLUS			
CN	Palladium (8CI, 9CI) (CA INDEX NAME)			

Pd

IT **16940-66-2, Sodium borohydride**  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (**recovery** of **palladium** from spent catalysts by separation as iodide and reduction)  
 RN 16940-66-2 HCAPLUS  
 CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

● Na<sup>+</sup>

L33 ANSWER 12 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1997:93860 HCAPLUS

DOCUMENT NUMBER: 126:106889

TITLE: Separation and recovery of **platinum-group metals** in solutions with high efficiency

INVENTOR(S): Kawasaki, Hajime; Amino, Maki; Nishimura, Kenji

PATENT ASSIGNEE(S): Mitsubishi Materials Corp, Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 10 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 08291345	A2	19961105	JP 1995-95134	19950420
JP 3348808	B2	20021120		

PRIORITY APPLN. INFO.: JP 1995-95134 19950420

AB The process comprises (1) formation of complexes by adding complexing agents selected from  $\geq 1$  phosphines, phosphites, dialkylsulfides, cyclopentadiene, and/or CO in aqueous solns. or organic solns. containing **Pt-group metal** salts, (2) optional solid-liquid separation, (3) extraction of the complexes by contacting with supercrit. fluids, and (4) blowing into  $\text{NH}_4\text{OH}$  aqueous solns. containing  $\text{N}_2\text{H}_4$ ,  $\text{NaBH}_4$ , thiourea, or  $\text{NH}_4\text{Cl}$  for recovery of **Pt-group metals**. The phosphines may be selected from trimethylphosphine, triethylphosphine, tripropylphosphine, or tributylphosphine. The phosphites may be selected from trimethylphosphite, triethylphosphite, tripropylphosphite, or tributylphosphite. The dialkylsulfides may be selected from butylsulfide, hexylsulfide, or octylsulfide. The supercrit. fluids. may be selected from  $\text{CO}_2$ , fluorocarbons, or  $\text{N}_2\text{O}$ .

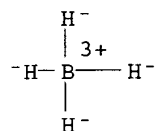
IT 16940-66-2, Sodium borohydride ( $\text{NaBH}_4$ )

RL: NUU (Other use, unclassified); USES (Uses)

(blowing of ammonia aqueous solns. containing; **platinum-group metals** separation and **recovery** by complexation and extraction with supercrit. fluids)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

●  $\text{Na}^+$ 

IT 14977-08-3P, Dichlorobis(tributylphosphine)palladium

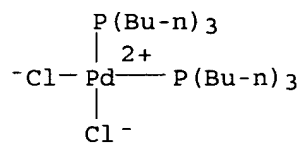
RL: PEP (Physical, engineering or chemical process); PNU (Preparation, unclassified); PREP (Preparation); PROC (Process)

(**platinum-group metals** separation and recovery by complexation and extraction with supercrit. fluids)

RN 14977-08-3 HCAPLUS

CN Palladium, dichlorobis(tributylphosphine)- (7CI, 8CI, 9CI) (CA INDEX

NAME)



IT 7440-05-3P, Palladium, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (platinum-group metals separation and recovery by  
 complexation and extraction with supercrit. fluids)  
 RN 7440-05-3 HCAPLUS  
 CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

L33 ANSWER 13 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1996:485373 HCAPLUS

DOCUMENT NUMBER: 125:201342

TITLE: Precipitation behavior of metallic **palladium** and **platinum** in aqueous solutions

AUTHOR(S): Sakurai, Hiroki; Hirokawa, Kichinosuke

CORPORATE SOURCE: Inst. Mater. Res., Tohoku Univ., Sendai, 980-77, Japan

SOURCE: Bunseki Kagaku (1996), 45(8), 795-798

CODEN: BNSKAK; ISSN: 0525-1931

PUBLISHER: Nippon Bunseki Kagakkai

DOCUMENT TYPE: Journal

LANGUAGE: Japanese

AB **Pd** and **Pt** were reduced and precipitated in aqueous acidic solns. by **sodium tetrahydroborate**, sodium phosphinate and ascorbic acid. **Pd** was reduced by all the reducing agents, but **Pt** was reduced by **sodium tetrahydroborate** only. Both **metal** could be reduced individually, but when they were co-existed, complete separation could not be achieved by these reduction

for the generation of active hydrogen during reduction of **Pd**. The technic is applicable to recycle and **recover Pt** and **Pd** from exhaust gas-purification waste catalysts.

IT 7440-05-3P, **Palladium**, preparation 7440-06-4P,

**Platinum**, preparation

RL: CAT (Catalyst use); PEP (Physical, engineering or chemical process); PUR (Purification or recovery); PREP (Preparation); PROC (Process); USES (Uses)

(precipitation behavior of metallic **palladium** and **platinum** in aqueous acidic solns. for separation recovery)

RN 7440-05-3 HCAPLUS

CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCAPLUS

CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

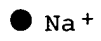
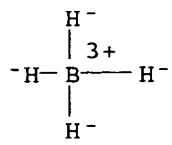
IT 16940-66-2, **Sodium tetrahydroborate**

RL: NUU (Other use, unclassified); USES (Uses)

(reducing agent; precipitation behavior of metallic **palladium** and **platinum** in aqueous acidic solns. for separation **recovery**)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



L33 ANSWER 14 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1996:148121 HCAPLUS  
 DOCUMENT NUMBER: 124:261743  
 TITLE: Preparation of N-(long-chain acyl)amino acids and their salts  
 INVENTOR(S): Kaneko, Yohei; Nishimoto, Yoshifumi  
 PATENT ASSIGNEE(S): Kao Corp, Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 6 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 07330699	A2	19951219	JP 1994-120924	19940602
PRIORITY APPLN. INFO.:			JP 1994-120924	19940602
OTHER SOURCE(S): MARPAT 124:261743				

AB The title salts, useful as surfactants and bacteriostats, are prepared by hydrolysis of R1CONR2R3CN [COR1 = C8-22 (un)saturated aliphatic acyl; R2 = H, C1-3 linear or branched alkyl; R3 = C1-5 linear or branched alkylene] in the presence of basic substances, followed by treatment of the resulting R1CONR2R3CO2M (M = cation) (I) with **metal** hydrides, by treatment of the resulting I with oxidizing agents, or by hydrogenation of the resulting I in the presence of hydrogenation catalysts. The salts are further treated with mineral acids to adjust pH at 1-5 to give the corresponding acyl amino acids. These methods provide the products with no offensive odor and coloration. A mixture of 70 g N-lauroyl- $\beta$ -aminopropionitrile, H<sub>2</sub>O, and an aqueous KOH solution was stirred at 90° for 15 h and the crude K N-lauroyl- $\beta$ -alaninate (II) obtained was further treated with NaBH<sub>4</sub> at 60° for 2 h to give 250 g aqueous solution containing 32.8% II with APHA color 100. After removal of NH<sub>3</sub> from the solution by evaporation, no offensive odor was detected.

IT **7440-02-0, Nickel**, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (Raney; preparation of (higher acyl)amino acids (salts) by hydrolysis of amidonitriles followed by chemical purification)  
 RN 7440-02-0 HCAPLUS  
 CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

IT **7440-05-3, Palladium**, uses **7440-06-4, Platinum**, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (preparation of (higher acyl)amino acids (salts) by hydrolysis of amidonitriles followed by chemical purification)  
 RN 7440-05-3 HCAPLUS  
 CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCAPLUS  
 CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

IT 11138-47-9, Sodium perborate 16940-66-2, Sodium  
borohydride

RL: RCT (Reactant); RACT (Reactant or reagent)  
(preparation of (higher acyl)amino acids (salts) by hydrolysis of  
amidonitriles followed by chemical purification)

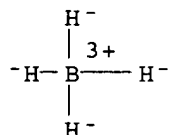
RN 11138-47-9 HCAPLUS

CN Perboric acid, sodium salt (8CI, 9CI) (CA INDEX NAME)

\*\*\* STRUCTURE DIAGRAM IS NOT AVAILABLE \*\*\*

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



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L33 ANSWER 15 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
ACCESSION NUMBER: 1995:964911 HCAPLUS  
DOCUMENT NUMBER: 124:96495  
TITLE: Process for removing oils and greases from industrial  
wastewaters  
INVENTOR(S): Guess, Robert G.  
PATENT ASSIGNEE(S): Romar Technologies, Inc., USA  
SOURCE: U.S., 12 pp. Cont.-in-part of U.S. Ser. No. 160,240,  
abandoned.  
CODEN: USXXAM  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 6  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 5462670	A	19951031	US 1994-218891	19940328
US 5122279	A	19920616	US 1991-682129	19910408
US 5298168	A	19940329	US 1992-893978	19920603
US 5545331	A	19960813	US 1995-386700	19950210
PRIORITY APPLN. INFO.:			US 1991-682129	A2 19910408
			US 1992-893978	A3 19920603
			US 1993-160240	B2 19931202
			US 1994-218891	A2 19940328

AB A process for removing dissolved oils and greases from an aqueous solution which

also may contain dissolved heavy **metals** is provided wherein the aqueous solution is mixed with a source of ferrous ion and dithionite ion in a first step at acidic pH to reduce and permit removal of solid heavy **metal**, is present and to sep. oils and greases from the aqueous solution The solution from the first step is reacted in a second step with hydroxide slurries obtained from third and fourth steps. A second step solution from the second step is reacted in a third step with an alkali composition and a third solution Optionally, the third solution is reacted with a chelating

agent

for iron and an oxidizer in a fourth step. A solution of chelated iron from the fourth step, when practical is disposed of. Oils and greases are recovered from the first step such as by skimming, and the heavy **metals** are recovered. The method provides effective treatment of contaminated groundwater, landfill leachate, sewage, mine drainage, slag pile drainage, mine tailings drainage, plating wastes, and etching wastes.

IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses

7440-66-6, Zinc, uses 16940-66-2, **Sodium borohydride**

RL: NUU (Other use, unclassified); USES (Uses)  
(**recovering** heavy **metals**, oils and greases from industrial wastewaters in multistage process)

RN 7429-90-5 HCAPLUS

CN Aluminum (8CI, 9CI) (CA INDEX NAME)

A1

RN 7439-89-6 HCAPLUS

CN Iron (7CI, 8CI, 9CI) (CA INDEX NAME)

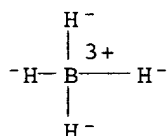


Fe

RN 7440-66-6 HCAPLUS  
 CN Zinc (7CI, 8CI, 9CI) (CA INDEX NAME)

Zn

RN 16940-66-2 HCAPLUS  
 CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

● Na<sup>+</sup>

IT 7439-92-1P, Lead, preparation 7440-02-0P, Nickel,  
 preparation 7440-05-3P, Palladium, preparation  
 7440-06-4P, Platinum, preparation 7440-22-4P,  
 Silver, preparation 7440-31-5P, Tin, preparation  
 7440-48-4P, Cobalt, preparation 7440-50-8P, Copper,  
 preparation 7440-57-5P, Gold, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (recovering heavy **metals**, oils and greases from industrial  
 wastewaters in multistage process)

RN 7439-92-1 HCAPLUS  
 CN Lead (8CI, 9CI) (CA INDEX NAME)

Pb

RN 7440-02-0 HCAPLUS  
 CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

RN 7440-05-3 HCAPLUS  
 CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCAPLUS  
 CN Platinum (8CI, 9CI) (CA INDEX NAME)

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Pt

RN 7440-22-4 HCAPLUS  
CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

RN 7440-31-5 HCAPLUS  
CN Tin (8CI, 9CI) (CA INDEX NAME)

Sn

RN 7440-48-4 HCAPLUS  
CN Cobalt (8CI, 9CI) (CA INDEX NAME)

Co

RN 7440-50-8 HCAPLUS  
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

RN 7440-57-5 HCAPLUS  
CN Gold (8CI, 9CI) (CA INDEX NAME)

Au

L33 ANSWER 16 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1995:563523 HCAPLUS  
 DOCUMENT NUMBER: 122:295785  
 TITLE: Ore leaching with non-cyanide redox solution for recovery of precious **metals**  
 INVENTOR(S): Martenson, Irvin; Mathis, Samuel A.  
 PATENT ASSIGNEE(S): USA  
 SOURCE: U.S., 6 pp.  
 CODEN: USXXAM  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 5401296	A	19950328	US 1994-266563	19940628
CA 2194137	AA	19960111	CA 1995-2194137	19950324
WO 9600801	A1	19960111	WO 1995-US3734	19950324
W: AU, BR, CA, CN, MX, RU				
AU 9521949	A1	19960125	AU 1995-21949	19950324
ZA 9502471	A	19960415	ZA 1995-2471	19950327
PRIORITY APPLN. INFO.:			US 1994-266563	A 19940628
			WO 1995-US3734	W 19950324

AB The aqueous slurry with 20-25% ore powder (size -250 mesh) for leaching of Au, Ag, and/or **Pt-group metals** is based on the aqueous solution containing NaBr 1.5-3.5, NaCl 3-6%, K<sub>2</sub>S<sub>2</sub>O<sub>8</sub> for the redox potential of 700-900 mV, and HCl for the pH of 3-4. The resulting leach liquor is pumped to a holding tank, and reacted with aqueous solution of NaOH and NaBH<sub>4</sub> at pH of 8.2-8.6 to precipitate the precious **metals** for recovery by filtration, followed by conventional separation and purification The liquor from filtration is electrochem. treated with replenishment of the salts, and recycled to the leaching stage. The K<sub>2</sub>S<sub>2</sub>O<sub>8</sub> is preferably com. Oxone triple salt. The redox leaching process is suitable for recovery of **Pt**, **Ir**, and **Pd** from volcanic ash.

IT 7440-05-3P, **Palladium**, preparation 7440-06-4P, **Platinum**, preparation 7440-22-4P, **Silver**, preparation 7440-57-5P, **Gold**, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (leaching of; ore leaching with non-cyanide redox solution for recovery of precious **metals**)  
 RN 7440-05-3 HCAPLUS  
 CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCAPLUS  
 CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

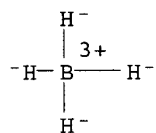
RN 7440-22-4 HCAPLUS  
 CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

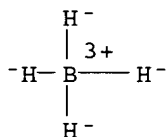
RN 7440-57-5 HCAPLUS  
CN Gold (8CI, 9CI) (CA INDEX NAME)

Au

IT **16940-66-2, Sodium borohydride** (NaBH<sub>4</sub>)  
RL: MOA (Modifier or additive use); USES (Uses)  
(redox solution containing; ore leaching with non-cyanide redox solution for  
**recovery of precious metals**)  
RN 16940-66-2 HCAPLUS  
CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



L33 ANSWER 17 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1994:196570 HCAPLUS  
 DOCUMENT NUMBER: 120:196570  
 TITLE: Rhodium, **platinum**, and **palladium**  
 recovery from new and spent automotive catalysts  
 AUTHOR(S): Wu, Kuo Ying Amanda; Wisecarver, Keith D.; Abraham,  
 Martin A.; Takach, Nicholas; Yang, Ningsheng  
 CORPORATE SOURCE: Dep. Chem. Eng., Univ. Tulsa, Tulsa, OK, 74104, USA  
 SOURCE: Precious Metals (1993), 17th, 343-9  
 CODEN: PRCMEU; ISSN: 8756-0917  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB The **recovery** of **Pt**, **Pa**, and **Rh** automotive catalysts by  
 leaching HCl + H<sub>2</sub>SO<sub>4</sub> with the addition of F<sup>-</sup> and H<sub>2</sub>O<sub>2</sub> including pretreatment  
 with Na **borohydride**, **sodium** formate and NaOH was  
 studied. The **recovery** of **metals** mainly depends on the  
 catalyst type and occurs in the following sequence **Pd**>**Pt**  
 >**Rh**. **Rh** **recovery** of 90% or better can be achieved from both new  
 and spent catalysts using pretreatment with sodium formate or NaOH.  
 IT 16940-66-2, **Sodium borohydrate**  
 RL: PROC (Process)  
 (recovery of **palladium** and **platinum** and  
 rhodium from spent automotive catalyst by leaching with acids and  
 pretreatment with)  
 RN 16940-66-2 HCAPLUS  
 CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



● Na<sup>+</sup>

IT 7440-05-3P, **Palladium**, preparation 7440-06-4P,  
**Platinum**, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (recovery of, from spent automotive catalyst by pretreatment and acid  
 leaching)  
 RN 7440-05-3 HCAPLUS  
 CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCAPLUS  
 CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

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L33 ANSWER 18 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1994:57151 HCAPLUS

DOCUMENT NUMBER: 120:57151

TITLE: Recovery of noble **metals** from solutions  
produced in oxidation reactions involving alkyl  
nitrites by treatment with reducing agentsINVENTOR(S): Landscheidt, Heinz; Klausener, Alexander; Blank, Heinz  
Ulrich

PATENT ASSIGNEE(S): Bayer A.-G., Germany

SOURCE: Ger. Offen., 6 pp.

CODEN: GWXXBX

DOCUMENT TYPE: Patent

LANGUAGE: German

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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DE 4137965	A1	19930527	DE 1991-4137965	19911119
EP 546324	A1	19930616	EP 1992-119030	19921106
EP 546324	B1	19950419		
R: AT, BE, CH, DE, FR, GB, IT, LI, NL				
AT 121316	E	19950515	AT 1992-119030	19921106
JP 05239567	A2	19930917	JP 1992-329900	19921117
PRIORITY APPLN. INFO.:			DE 1991-4137965	A 19911119

AB Wastewaters containing **metals** or **metal** salts are treated with a reducing agent and an additive to reduce the **metals**, which are recovered in the metallic form. Suitable reducing agents include H<sub>2</sub>, CO, or a complex hydride, preferably a boron hydride of Group I or II **metals**, especially Na, K, Li, or Zn. The additive is a primary or secondary amino group which can react with nitrous acid, e.g., ammonia, an ammonium salt, ammonium chloride, Me ammonium chloride, urea, or amidosulfonic acid. The metallic form can be changed to a salt form by oxidation with an oxidizing agent in an aqueous acid solution, e.g., HCl or acetic acid. Suitable oxidizing agents include chlorates or nitrates of alkali or alkaline earth **metals** or ammonium ion, HNO<sub>3</sub>, or H<sub>2</sub>O<sub>2</sub>. The method is suitable for recovering Pt group **metals**, especially Pd.

IT 7647-10-1, **Palladium** chloride

RL: CAT (Catalyst use); USES (Uses)

(catalysts, for Me acrylate reaction with Me nitrite, recovery of)

RN 7647-10-1 HCAPLUS

CN Palladium chloride (PdCl<sub>2</sub>) (6CI, 8CI, 9CI) (CA INDEX NAME)

Cl-Pd-Cl

IT 7440-05-3P, **Palladium**, preparation

RL: PREP (Preparation)

(recovery of, from oxidation reaction mixts.)

RN 7440-05-3 HCAPLUS

CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

IT 13762-51-1 16940-66-2 16949-15-8,

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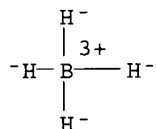
**Lithium boron hydride 17611-70-0**

RL: USES (Uses)

(reducing agents, in **recovery** of noble metal catalysts)

RN 13762-51-1 HCAPLUS

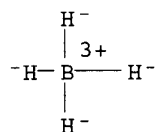
CN Borate(1-), tetrahydro-, potassium (8CI, 9CI) (CA INDEX NAME)



● K<sup>+</sup>

RN 16940-66-2 HCAPLUS

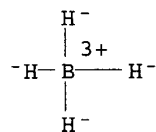
CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



● Na<sup>+</sup>

RN 16949-15-8 HCAPLUS

CN Borate(1-), tetrahydro-, lithium (8CI, 9CI) (CA INDEX NAME)

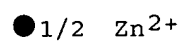
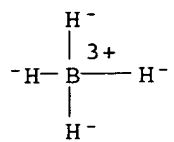


● Li<sup>+</sup>

RN 17611-70-0 HCAPLUS

CN Borate(1-), tetrahydro-, zinc (2:1) (9CI) (CA INDEX NAME)





L33 ANSWER 19 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1994:12294 HCAPLUS  
 DOCUMENT NUMBER: 120:12294  
 TITLE: Recovery of **platinum-group metals**  
 from **metal** foil support catalysts  
 INVENTOR(S): Ito, Hidetoshi; Eto, Yoshuki  
 PATENT ASSIGNEE(S): Nissan Motor, Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 3 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 05212296	A2	19930824	JP 1992-17614	19920203
PRIORITY APPLN. INFO.:			JP 1992-17614	19920203

AB The recovery involves (1) soaking the **metal** foil-supported catalysts in solns. containing NaOH  $\geq 20$ , NaHSO<sub>4</sub> 1-10, and Na boron hydride  $\geq 0.1$  weight%, (2) dissolving the Al<sub>2</sub>O<sub>3</sub>- and CeO<sub>2</sub> coating layers (as catalyst active layer), and (3) recovering the **Pt**-group **metals** as **platinum** black. The method can recover the **metals** efficiently, and the method is applied to catalysts for such as exhaust gas purification

IT 1344-28-1, Alumina, uses

RL: USES (Uses)

(coat layers, catalysts containing, **metal** foil-support, recovery of **platinum-group metals** from)

RN 1344-28-1 HCAPLUS

CN Aluminum oxide (Al<sub>2</sub>O<sub>3</sub>) (8CI, 9CI) (CA INDEX NAME)

\*\*\* STRUCTURE DIAGRAM IS NOT AVAILABLE \*\*\*

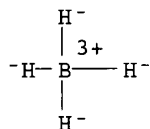
IT 16940-66-2

RL: PROC (Process)

(dissoln. of alumina and ceria coat layers in solns. containing, in **recovery recovery** of **platinum-group metals** from **metal** foil-support catalysts)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



● Na<sup>+</sup>

IT 7440-05-3P, **Palladium**, preparation 7440-06-4P, **Platinum**, preparation

RL: PUR (Purification or recovery); PREP (Preparation)  
 (recovery of, from **metal** foil-support catalysts containing alumina coat layers)

RN 7440-05-3 HCAPLUS

Valenrod 10\_721479

CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCAPLUS

CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

L33 ANSWER 20 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1992:637544 HCAPLUS

DOCUMENT NUMBER: 117:237544

TITLE: Precious **metal** leaching with iodine-iodide solutions

INVENTOR(S): Sloan, Hilbert

PATENT ASSIGNEE(S): Shapiro, Nelson H., USA

SOURCE: U.S., 11 pp. Cont. of U.S. Ser. No. 69,100, abandoned.

CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 5137700	A	19920811	US 1989-342587	19890424
PRIORITY APPLN. INFO.:			US 1987-69100	B1 19870702

AB Precious **metals** (especially Au, Ag, **Pd**, and **Pt**) are recovered from electroplated scrap or articles by immersion into aqueous etching bath containing I 1, NH<sub>4</sub>I (or HI) 4, and water 10 parts. The precious **metals** are oxidized by I, form a soluble complex with the iodide, and can be precipitated from the solution by addition of a weak reducing agent (especially hydroxylamine or NaBH<sub>4</sub>) and recovered by filtration. The filtrate is oxidized with H<sub>2</sub>O<sub>2</sub> or (NH<sub>4</sub>)<sub>2</sub>S<sub>2</sub>O<sub>8</sub> to precipitate elemental I for recycling to the etching stage.

IT **7440-05-3P, Palladium**, preparation **7440-06-4P, Platinum**, preparation **7440-22-4P, Silver**, preparation **7440-57-5P, Gold**, preparation

RL: PUR (Purification or recovery); PREP (Preparation)  
(recovery of, from electroplated scrap, leaching with iodine-iodide solution for)

RN 7440-05-3 HCAPLUS

CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCAPLUS

CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

RN 7440-22-4 HCAPLUS

CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

RN 7440-57-5 HCAPLUS

CN Gold (8CI, 9CI) (CA INDEX NAME)

Au

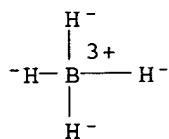
IT 16940-66-2, Sodium borohydride

RL: PROC (Process)

(reducing agent, precious metal recovery with,  
after leaching with aqueous iodine-iodide solution)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



● Na<sup>+</sup>

Valenrod 10\_721479

L33 ANSWER 21 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1992:595687 HCAPLUS

DOCUMENT NUMBER: 117:195687

TITLE: Recovery of **palladium** from tetraamminepalladium dichloride solutions by reduction

INVENTOR(S): Suzuki, Masahito; Nagai, Makoto

PATENT ASSIGNEE(S): N. E. Chemcat Corp., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 3 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

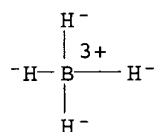
FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	JP 04165030	A2	19920610	JP 1990-287703	19901025
PRIORITY APPLN. INFO.:				JP 1990-287703	19901025
AB	[Pd(NH3)4]Cl2 solns. are added to solns. containing a strong alkaline reducer. Agglomeration-free Pd powders are prepared without loss.				
IT	7440-05-3P, <b>Palladium</b> , preparation				
	RL: PREP (Preparation)				
	(recovery of powdered, from tetraamminepalladium chloride, by reduction with alkaline reducer)				
RN	7440-05-3 HCAPLUS				
CN	Palladium (8CI, 9CI) (CA INDEX NAME)				

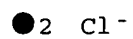
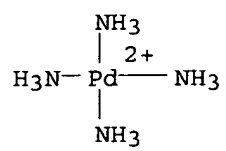
Pd

IT 16940-66-2, **Sodium borohydride**  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reduction by, of tetraamminepalladium chloride, for **recovery** of powdered **palladium**)  
RN 16940-66-2 HCAPLUS  
CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



● Na<sup>+</sup>

IT 13815-17-3  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reduction of, by alkaline reducer, for recovery of powdered **palladium**)  
RN 13815-17-3 HCAPLUS  
CN Palladium(2+), tetraammine-, dichloride, (SP-4-1)- (9CI) (CA INDEX NAME)



L33 ANSWER 22 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1991:189660 HCAPLUS

DOCUMENT NUMBER: 114:189660

TITLE: Reducing agent for recovery of precious **metals**  
from cyanide solutions

INVENTOR(S): Shoda, Toshiaki

PATENT ASSIGNEE(S): Nippon Electro Plating Engineers K. K., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 3 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 02163327	A2	19900622	JP 1988-316335	19881216

PRIORITY APPLN. INFO.: JP 1988-316335 19881216

AB The loaded cyanide feed solution (especially from leaching) is reduced with powdered Al, powdered Zn, N<sub>2</sub>H<sub>4</sub>, alkali **metal** salt of HB, H<sub>2</sub>PO<sub>3</sub>, and/or dithionous acid, and/or a carbonyl compound to recover the precious **metal**. Thus, the aqueous solution (pH 13) containing 50 g KCN/L and 4.3 g Au/L was mixed with powdered Al 0.2, HCHO 1.0, and N<sub>2</sub>H<sub>4</sub> 0.1M, and showed the residual Au of 2.5 after 1 day and 1.6 mg/L after 5 days.

IT **7440-57-5P**, Gold, preparation  
RL: PUR (Purification or recovery); PREP (Preparation)  
(recovery of, from cyanide solution, reducing agents for)

RN 7440-57-5 HCAPLUS

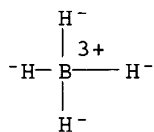
CN Gold (8CI, 9CI) (CA INDEX NAME)

Au

IT **16940-66-2 7429-90-5**, Aluminum, uses and miscellaneous  
**7440-66-6**, Zinc, uses and miscellaneous  
RL: PROC (Process)  
(reducing agent, gold **recovery** with, from aqueous cyanide solution)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

● Na<sup>+</sup>

RN 7429-90-5 HCAPLUS

CN Aluminum (8CI, 9CI) (CA INDEX NAME)



Al

RN 7440-66-6 HCAPLUS  
CN Zinc (7CI, 8CI, 9CI) (CA INDEX NAME)

Zn

IT 7440-50-8, Copper, uses and miscellaneous  
RL: USES (Uses)  
(reducing agent, gold recovery with, from cyanide solution)  
RN 7440-50-8 HCAPLUS  
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

L33 ANSWER 23 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1991:16564 HCAPLUS

DOCUMENT NUMBER: 114:16564

TITLE: Separation of rhodium(III) from solutions, containing  
iridium(IV) and -(III)

AUTHOR(S): Volkov, A. A.; Khain, V. S.

CORPORATE SOURCE: Ukhtinsk. Ind. Inst., Ukhta, USSR

SOURCE: Zhurnal Neorganicheskoi Khimii (1990), 35(9), 2220-3  
CODEN: ZNOKAQ; ISSN: 0044-457X

DOCUMENT TYPE: Journal

LANGUAGE: Russian

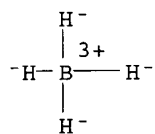
AB A mixture of Ir(IV) as IrCl<sub>6</sub><sup>2-</sup> or Ir(III) as IrCl<sub>6</sub><sup>3-</sup> with Rh(III) as  
Rh(OH)<sub>6</sub><sup>3-</sup> was separated in strong acidic media (pH < 1) by NaBH<sub>4</sub>. The method  
can be used in refining **Pt-group metals** and for their  
concentration with high yield and purity.IT **16940-66-2**, Sodium tetrahydroborate

RL: RCT (Reactant); RACT (Reactant or reagent)

(reduction by, of trivalent rhodium or tetravalent or trivalent iridium in  
separation of rhodium from iridium)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

● Na<sup>+</sup>

L33 ANSWER 24 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1990:408958 HCAPLUS  
 DOCUMENT NUMBER: 113:8958  
 TITLE: Chemical separation for **platinum** from rhodium  
 INVENTOR(S): Zhang, Jian; Xu, Ying; Zhang, Ji  
 PATENT ASSIGNEE(S): Xian Non-Ferrous Metals Institute, Peop. Rep. China  
 SOURCE: Faming Zhuanli Shenqing Gongkai Shuomingshu, 5 pp.  
 CODEN: CNXXEV  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Chinese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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CN 1034143	A	19890726	CN 1988-100131	19880111
CN 1011599	B	19910213		

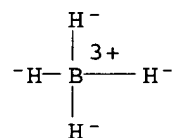
PRIORITY APPLN. INFO.: CN 1988-100131 19880111

AB In electrolysis of **Pt**-Rh alloy, a small amount of H<sub>2</sub>O<sub>2</sub> is added to the electrolyte solution for increasing the dissolving of **Pt**-Rh alloy electrodes, and the resulting electrolyte solution is then mixed with KCl to form **Pt** compound precipitate. The **Pt** compound precipitate is reduced with NaBH<sub>4</sub> to recover ≥99% pure **Pt**. Thus, waste **Pt**-Rh alloy chips were pressed to form electrodes, immersed into 8N HCl, placed in an electrolysis cell with magnetic stirrer, added 6 mL H<sub>2</sub>O<sub>2</sub>, and then electrolyzed at 180 mA/cm<sup>2</sup> for 3 h. The electrolyte solution containing 72.568 g/L Rh and 8.063 g/L **Pt** was mixed with 120% KCl, precipitated and filtered to obtain yellow precipitate, which was then washed with 10% KCl and 5% HCl solns., dried, and reduced with NaBH<sub>4</sub> to recover 99.5% pure **Pt**. The filtrate was passed through an ion-exchange resin bed to recover 99.9% pure Rh.

IT 16940-66-2  
 RL: USES (Uses)  
 (reducing agent, for **platinum** recovery, in electrolysis of **platinum**-rhodium alloy)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



● Na<sup>+</sup>

IT 7440-06-4P, **Platinum**, preparation

RL: PREP (Preparation)  
 (separation of, from **platinum**-rhodium alloy, by electrolysis, hydrogen peroxide addition in)

RN 7440-06-4 HCAPLUS

CN **Platinum** (8CI, 9CI) (CA INDEX NAME)

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Pt

L33 ANSWER 25 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1989:621064 HCAPLUS  
 DOCUMENT NUMBER: 111:221064  
 TITLE: Recovering of noble **metal** from solution  
 INVENTOR(S): Yamazaki, Hiroshi; Tateno, Yoshihisa  
 PATENT ASSIGNEE(S): Tanaka Noble Metal Industrial Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 3 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

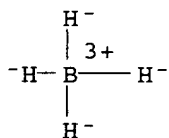
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 01083682	A2	19890329	JP 1987-241755	19870926
PRIORITY APPLN. INFO.:			JP 1987-241755	19870926
AB A method for recovering a noble <b>metal</b> contained in a solution at least partially as a complex involves electrolysis to reduce the noble <b>metal</b> ions followed by recovery as well as to decompose the complex and recovering the noble <b>metal</b> ions formed by the decomposition using a reducing agent.				
IT 7440-05-3P, Palladium, preparation 7440-06-4P, Platinum, preparation				
RL: PREP (Preparation) (recovery of, by electrolysis and reducing agents)				
RN	7440-05-3 HCAPLUS			
CN	Palladium (8CI, 9CI) (CA INDEX NAME)			

Pd

RN 7440-06-4 HCAPLUS  
 CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

IT 16940-66-2, Sodium borohydride  
 RL: PRP (Properties)  
 (reducing agents, in **recovery** of noble **metals**)  
 RN 16940-66-2 HCAPLUS  
 CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

● Na<sup>+</sup>

Valenrod 10\_721479

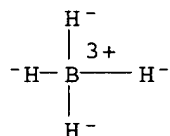
L33 ANSWER 26 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1989:599088 HCAPLUS  
 DOCUMENT NUMBER: 111:199088  
 TITLE: Recovery of **platinum-group metals**  
 from spent catalysts  
 INVENTOR(S): Ezawa, Nobuyasu  
 PATENT ASSIGNEE(S): Tanaka Noble Metal Industrial Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 5 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 01108323	A2	19890425	JP 1987-264961	19871020
PRIORITY APPLN. INFO.:			JP 1987-264961	19871020

AB Spent catalysts of supported type containing **Pt-group metals** and/or their oxides are treated to recover the **metal** values. The process comprises: (1) reduction with NaBH<sub>4</sub>; (2) washing for Na removal; (3) chlorination leaching with aqueous HCl and sparged Cl; (4) leaching with aqueous HCl; (5) fluidized-bed treatment for cathodic recovery of **Pt**-group **metals** on C particles in an electrolysis cell; and (6) recirculating the spent solns. for addnl. leaching.

IT **16940-66-2, Sodium borohydride** (NaBH<sub>4</sub>)  
 RL: PROC (Process)  
 (reduction with, of spent catalysts containing **metal** oxides in **platinum-group metal recovery**)

RN 16940-66-2 HCAPLUS  
 CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



● Na<sup>+</sup>

L33 ANSWER 27 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1989:410611 HCAPLUS

DOCUMENT NUMBER: 111:10611

TITLE: Recovery of **platinum-group metal**  
from spent electrode

INVENTOR(S): Sato, Hiroyasu; Maeda, Osamu

PATENT ASSIGNEE(S): Tanaka Noble Metal Industrial Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 3 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 01008228	A2	19890112	JP 1987-163182	19870630
JP 2575715	B2	19970129		

PRIORITY APPLN. INFO.: JP 1987-163182 19870630

AB A spent electrode from NaCl electrolysis is treated to recover **Pt**-group **metals** by reduction of the PdO<sub>2</sub>, PtO<sub>2</sub>, and/or RhO<sub>2</sub> layer on the surface with a reducing agent (especially HCHO) followed by leaching.

Thus,

a spent electrode from Ti mesh coated with 6:4 (mol) **Pt**-PdO<sub>2</sub> layer was reduced with aqueous 0.5% N<sub>2</sub>H<sub>2</sub>.2HCl, and then leached with 6:1 HCl-HNO<sub>3</sub> mixture at 40-80°. The leached electrode was recoated with **Pt** and PdO<sub>2</sub>, and then used in NaCl electrolysis.

IT 7440-05-3P, **Palladium**, preparation 7440-06-4P,**Platinum**, preparation

RL: PUR (Purification or recovery); PREP (Preparation)

(recovery of, from spent electrode in salt electrolysis, reduction and leaching in)

RN 7440-05-3 HCAPLUS

CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCAPLUS

CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

IT 16940-66-2

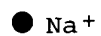
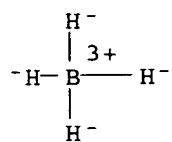
RL: PROC (Process)

(reduction with, for **platinum-group metal****recovery** from spent salt-electrolysis electrode)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)





L33 ANSWER 28 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1989:158128 HCAPLUS

DOCUMENT NUMBER: 110:158128

TITLE: Recovery of **platinum-group metals**  
from spent electrodes

INVENTOR(S): Sato, Hiroyasu; Maeda, Osamu

PATENT ASSIGNEE(S): Tanaka Noble Metal Industrial Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 3 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 63270421	A2	19881108	JP 1987-104133	19870427

PRIORITY APPLN. INFO.: JP 1987-104133 19870427

AB Spent NaCl-electrolysis electrodes coated with a **Pt**-group **metal** oxide are treated to recover **Pt**, Ir, and Ru. The oxide coating is reduced, leached with aqueous solution containing HCl and HNO<sub>3</sub> to recover a part of **Pt** and Ir, and then electrolyzed in a fluoride bath for coating separation. Suitable reducing agents are N<sub>2</sub>H<sub>4</sub>, NaBH<sub>4</sub>, and sulfites, and the fluoride is HF and/or NH<sub>4</sub>HF<sub>2</sub>. Thus, spent Ti electrodes had a coating with 88:12:5 mol mixture of **Pt** oxide, Ir<sub>2</sub>O<sub>3</sub>, and Ru oxide. The electrodes were dipped for 1 h in aqueous 0.2% N<sub>2</sub>H<sub>4</sub>·2HCl, and then for 1.5 h in 6:1 HCl:HNO<sub>3</sub> mixture at 60-70°. The treated electrodes as anode were electrolyzed at 0.2 A/dm<sup>2</sup> and 4.2 V for 10 min in aqueous bath containing 5 weight% each of HF and NH<sub>4</sub>HF<sub>2</sub>. The **Pt**, Ir, and Ru were recovered.

IT **7440-06-4P, Platinum**, preparation  
RL: PUR (Purification or recovery); PREP (Preparation)  
(recovery of, from spent electrolysis electrodes, reduction of oxide coating for electrochem.)

RN 7440-06-4 HCAPLUS

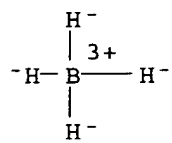
CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

IT **16940-66-2**  
RL: PROC (Process)  
(reduction with, of **metal** oxide coating on spent electrode, **recovery of platinum-group metals** after)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



L33 ANSWER 29 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1989:158127 HCAPLUS

DOCUMENT NUMBER: 110:158127

TITLE: Recovery of **platinum-group metals**  
from spent electrodes

INVENTOR(S): Sato, Hiroyasu; Maeda, Osamu

PATENT ASSIGNEE(S): Tanaka Noble Metal Industrial Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 3 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 63270420	A2	19881108	JP 1987-104132	19870427

PRIORITY APPLN. INFO.: JP 1987-104132 19870427

AB Spent NaCl-electrolysis electrodes having a **Pt**-group **metal** oxide coating are treated to recover **Pt**, **In**, and **Ru**. The oxide coating is reduced, leached with aqueous solution containing **HCl** and **HNO3** to recover a part of **Pt** and **In**, and then contacted with a mixture of **HNO3**, **H2SO4**, and **HF** for dissoln. Suitable reducing agents are **N2H4**, **N2H4**, **NaBH4**, and sulfites. Thus, spent **Ti** electrodes had a coating with 88:12:5 mol mixture of **Pt** oxide, **In2O3**, and **Ru** oxide. The electrodes were treated for 1 h in aqueous 0.2% **N2H4.2HCl**, for 1.5 h in 6:1 **HCl:HNO3** solution at 60-70°, and then for 10 min at 50-60° in a solution containing **HNO3** 2, **H2SO4** 2, **HF** 1, and water 5 volume parts to recover **Pt**, **Ir**, and **Ru**.

IT **7440-06-4P, Platinum**, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (recovery of, from spent electrodes, reduction of oxide coatings for leaching in)

RN 7440-06-4 HCAPLUS

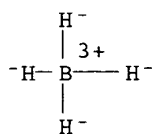
CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

IT **16940-66-2**  
 RL: PROC (Process)  
 (reduction with, of oxide coating on spent electrode, **recovery** of **platinum-group metals** after)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

● Na<sup>+</sup>

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L33 ANSWER 30 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1986:37545 HCAPLUS  
 DOCUMENT NUMBER: 104:37545  
 TITLE: Winning precious **metals** from geological brines  
 INVENTOR(S): Luebbe, Ray H., Jr.; Wemhoff, Mark  
 PATENT ASSIGNEE(S): Environmental Technology (U.S.), Inc., USA  
 SOURCE: Eur. Pat. Appl., 22 pp.  
 CODEN: EPXXDW  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 159842	A2	19851030	EP 1985-302382	19850404
R: DE, FR, GB				
PRIORITY APPLN. INFO.:			US 1984-601792	A 19840419
			US 1984-610385	A 19840515

AB Geothermal and oil-field brines are contacted with an inorg. glassy material for selective adsorption of precious **metals**, especially after surface pretreatment by reduction. The **metal**-loaded glass is leached (e.g. with aqua regia) and recycled. Hydrophobic organic plastics and clays (especially attapulgite) are used as adsorbents. The brines are optionally pretreated with an oxidizing agent to enhance recovery of precious **metals** at less than +200 mV (redox) to avoid sorption of S and base elements. Thus, oil-field brine 5 gal was circulated at 2.4 L/min for 16 h through a glass chromatog. column packed with glass beads of 4 mm diameter. The beads were washed with deionized water 125 mL of pH 9.5, and 5 mL of cyanogen iodide solution was added. Recovery of Ag was only 0.03 mg/L, but was increased to 0.3 mg/L by extraction with aqua regia in 1:1 solution

IT 1309-48-4, uses and miscellaneous 1344-28-1, uses and miscellaneous  
 RL: USES (Uses)  
 (activated, for adsorption of precious **metals** from brines)

RN 1309-48-4 HCAPLUS  
 CN Magnesium oxide (MgO) (9CI) (CA INDEX NAME)

Mg=O

RN 1344-28-1 HCAPLUS  
 CN Aluminum oxide (Al<sub>2</sub>O<sub>3</sub>) (8CI, 9CI) (CA INDEX NAME)

\*\*\* STRUCTURE DIAGRAM IS NOT AVAILABLE \*\*\*

IT 7440-05-3P, preparation 7440-06-4P, preparation  
 7440-22-4P, preparation 7440-57-5P, preparation  
 RL: PUR (Purification or recovery); PREP (Preparation)  
 (recovery of, from brines, glassy sorbents for)

RN 7440-05-3 HCAPLUS  
 CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCAPLUS  
 CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

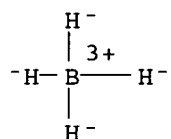
RN 7440-22-4 HCAPLUS  
CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

RN 7440-57-5 HCAPLUS  
CN Gold (8CI, 9CI) (CA INDEX NAME)

Au

IT **16971-29-2P**  
RL: PREP (Preparation)  
(reduction with, of glassy sorbent for precious **metal**  
**recovery** from brines)  
RN 16971-29-2 HCAPLUS  
CN Borate(1-), tetrahydro- (8CI, 9CI) (CA INDEX NAME)

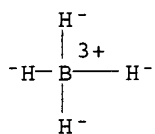


L33 ANSWER 31 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1985:508225 HCAPLUS  
 DOCUMENT NUMBER: 103:108225  
 TITLE: Recovery of **platinum metals**  
 especially ruthenium  
 PATENT ASSIGNEE(S): Daido Steel Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 3 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 60092433	A2	19850524	JP 1983-199154	19831026

PRIORITY APPLN. INFO.: JP 1983-199154 19831026  
 AB Spent electrodes or catalysts are fused with KOH + KNO<sub>3</sub> (or K<sub>2</sub>S<sub>2</sub>O<sub>7</sub>),  
 stirred in water, and filtered. The filtrate is adjusted to pH 5-6, and  
 filtered. The precipitate is dissolved in dilute HCl, filtered, and the  
 filtrate  
 reduced with NaBH<sub>4</sub> to obtain the **Pt-group metals**.  
 Thus, spent electrodes 15 g were processed with KOH + KNO<sub>3</sub>, to recover 23  
 mg **metal** containing Ru 87 and Ir 3.8%. The residue was heated at  
 800° to recover 56 mg sublimate containing 70% RuO<sub>2</sub>.  
 IT **16940-66-2**  
 RL: PROC (Process)  
 (reduction with, in processing of spent catalysts and electrodes for  
**platinum-group metal recovery**)  
 RN 16940-66-2 HCAPLUS  
 CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

● Na<sup>+</sup>



L33 ANSWER 32 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

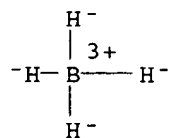
ACCESSION NUMBER: 1983:581262 HCAPLUS  
 DOCUMENT NUMBER: 99:181262  
 TITLE: Oxygen scavenging  
 PATENT ASSIGNEE(S): Kurita Kogyo Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 3 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 58079590	A2	19830513	JP 1981-177765	19811105
JP 59032195	B4	19840807		

PRIORITY APPLN. INFO.: JP 1981-177765 19811105  
 AB An O-containing water is treated with a Pd catalyst in the presence of NaBH<sub>4</sub> and/or N<sub>2</sub>H<sub>4</sub> (or its hydrate). The Pd catalyst is loaded on an anion exchanger. Thus, a Pd chloride was treated with Lewatit OC 1045 [78769-27-4] to prepare a Pd catalyst. Boiler water was mixed with NaBH<sub>4</sub> and then passed through a column containing the Pd-anion exchanger. The dissolved O in the eluent was 0.1 mg/L after 200 L water/h-L resin.  
 IT 7440-05-3, uses and miscellaneous  
 RL: CAT (Catalyst use); USES (Uses)  
 (catalyst, for oxygen scavenging from boiler water, Lewatit OC 1045 support for)  
 RN 7440-05-3 HCAPLUS  
 CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

IT 16940-66-2  
 RL: OCCU (Occurrence)  
 (in oxygen scavenging in boiler water)  
 RN 16940-66-2 HCAPLUS  
 CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

● Na<sup>+</sup>

L33 ANSWER 33 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1983:164610 HCAPLUS

DOCUMENT NUMBER: 98:164610

TITLE: The treatment of spent electroless nickel baths by autocatalytic reduction

AUTHOR(S): Parker, Konrad

CORPORATE SOURCE: Park Ridge, IL, 60068, USA

SOURCE: Plating and Surface Finishing (1983), 70(3), 60-2  
CODEN: PSFMDH; ISSN: 0360-3164

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The autocatalytic decomposition of some spent electroless Ni baths using NaBH<sub>4</sub> and/or Pd ions can reduce the Ni concentration to ≤10 mg/L. The chemical of the plating solution appears to be a controlling factor.

IT 7440-02-0P, preparation

RL: PUR (Purification or recovery); PREP (Preparation)  
(recovery of, from spent electroless bath, by autocatalytic reduction)

RN 7440-02-0 HCAPLUS

CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

IT 7647-10-1 16940-66-2

RL: RCT (Reactant); RACT (Reactant or reagent)  
(reduction by, of spent electroless bath, for nickel **recovery**)

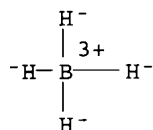
RN 7647-10-1 HCAPLUS

CN Palladium chloride (PdCl<sub>2</sub>) (6CI, 8CI, 9CI) (CA INDEX NAME)

Cl-Pd-Cl

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



● Na<sup>+</sup>

L33 ANSWER 34 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1982:620285 HCAPLUS

DOCUMENT NUMBER: 97:220285

TITLE: Applications for **sodium borohydride**  
in precious **metal recovery** and  
recycle

AUTHOR(S): Medding, G. L.; Lander, J. A.

CORPORATE SOURCE: Thiokol/Ventron Div., Danvers, MA, 01923, USA

SOURCE: Precious Met. [Proc. Int. Precious Met. Inst. Conf.],  
5th (1982), Meeting Date 1981, 3-10. Editor(s): Zysk,  
Edward D. Pergamon: Willowdale, Ont.  
CODEN: 48RYAT

DOCUMENT TYPE: Conference

LANGUAGE: English

AB NaBH<sub>4</sub> recovery operations are used in precious **metal** recovery applications. The most established precious **metal** recovery use is Ag removal from spent photog. fixing solns. Ag recovery of >99% at >95% purity can be achieved with this process. Applications have been developed for reduction of AgCl via a process which is capable of achieving extremely pure Ag with >99% recovery of Ag from scrap. Applications are being developed in the areas of **Pt**, **Pd**, and **Rh** recovery from spent catalyst materials. NaBH<sub>4</sub> is being used com. for recovery of most of the precious **metals**.

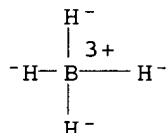
IT 16940-66-2

RL: PROC (Process)

(in precious **metal recovery**)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

● Na<sup>+</sup>

IT 7440-06-4P, preparation 7440-22-4P, preparation

RL: PUR (Purification or recovery); PREP (Preparation)  
(recovery of, **sodium borohydride** in)

RN 7440-06-4 HCAPLUS

CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

RN 7440-22-4 HCAPLUS

CN Silver (8CI, 9CI) (CA INDEX NAME)

Ag

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L33 ANSWER 35 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1982:168042 HCAPLUS

DOCUMENT NUMBER: 96:168042

TITLE: Sodium borohydride controls heavy metal discharge

AUTHOR(S): Cook, Michael M.; Lander, Joseph A.

CORPORATE SOURCE: Ventron Div., Thiokol Corp., Danvers, MA, USA

SOURCE: Pollution Engineering (1981), 13(12), 36-8

CODEN: PLENBW; ISSN: 0032-3640

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Discharge of heavy **metals** into sewer systems and open waters is a major concern to both publicly owned treatment works and industries. Using NaBH<sub>4</sub> as an alternative chemical treatment has enabled a number of plants to meet wastewater discharge limits in a cost-effective manner. It provides an effective and economical method for the removal of pollutants or for the recovery of precious **metals**, including Co, Cu, Au, Ir, Pb, Hg, Ni, **Pd**, **Pt**, Rh, and Hg. The **metal** is chemical reduced to the elemental state, usually as a compact precipitate

The NaBH<sub>4</sub> process is irreversible, extremely rapid, and results in nearly total removal of the dissolved **metals** even at low initial concentration

IT 7439-92-1P, preparation 7440-02-0P, preparation

7440-05-3P, preparation 7440-06-4P, preparation

7440-22-4P, preparation 7440-48-4P, preparation

7440-50-8P, preparation 7440-57-5P, preparation

RL: PREP (Preparation)

(**recovery** of, from wastewater, precipitation by **sodium borohydride** in)

RN 7439-92-1 HCAPLUS

CN Lead (8CI, 9CI) (CA INDEX NAME)

Pb

RN 7440-02-0 HCAPLUS

CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

RN 7440-05-3 HCAPLUS

CN Palladium (8CI, 9CI) (CA INDEX NAME)

Pd

RN 7440-06-4 HCAPLUS

CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

RN 7440-22-4 HCAPLUS

CN Silver (8CI, 9CI) (CA INDEX NAME)

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Ag

RN 7440-48-4 HCAPLUS  
CN Cobalt (8CI, 9CI) (CA INDEX NAME)

Co

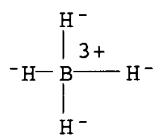
RN 7440-50-8 HCAPLUS  
CN Copper (7CI, 8CI, 9CI) (CA INDEX NAME)

Cu

RN 7440-57-5 HCAPLUS  
CN Gold (8CI, 9CI) (CA INDEX NAME)

Au

IT **16940-66-2**  
RL: PROC (Process)  
(wastewater treatment by, **metal** precipitation in)  
RN 16940-66-2 HCAPLUS  
CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)



● Na<sup>+</sup>

L33 ANSWER 36 OF 36 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1975:485606 HCAPLUS

DOCUMENT NUMBER: 83:85606

TITLE: Aromatic hydrogenation using sodium borohydride  
reduced transition **metal** supported catalysts

INVENTOR(S): Benson, Robert F.

PATENT ASSIGNEE(S): Texaco Inc., USA

SOURCE: U.S., 5 pp.

CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 3869521	A	19750304	US 1972-319574	19721229
PRIORITY APPLN. INFO.:			US 1971-158581	A1 19710630

AB Supported transition **metal** catalysts are provided by a method comprising impregnating a catalyst support with a solution comprising a catalyst **metal** ion; at least partially drying the saturated catalyst support; admixing the dried catalyst support with **sodium borohydride** aqueous solution until the evolution of gas ceases, thereby obtaining an active supported **metal** catalyst; and thereafter, **recovering** the active catalyst.

IT 7440-02-0, uses and miscellaneous  
RL: CAT (Catalyst use); USES (Uses)  
(catalysts, for demethylation of methylnaphthalene, manufacture of)

RN 7440-02-0 HCAPLUS

CN Nickel (8CI, 9CI) (CA INDEX NAME)

Ni

IT 7440-06-4, uses and miscellaneous  
RL: CAT (Catalyst use); USES (Uses)  
(catalysts, for hydrogenation of benzene, manufacture of)

RN 7440-06-4 HCAPLUS

CN Platinum (8CI, 9CI) (CA INDEX NAME)

Pt

IT 7440-05-3, uses and miscellaneous  
RL: CAT (Catalyst use); USES (Uses)  
(catalysts, for hydrogenation of toluene, manufacture of)

RN 7440-05-3 HCAPLUS

CN Palladium (8CI, 9CI) (CA INDEX NAME)

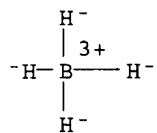
Pd

IT 16940-66-2  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(reduction by, in preparation of hydrogenation catalysts)

RN 16940-66-2 HCAPLUS

CN Borate(1-), tetrahydro-, sodium (8CI, 9CI) (CA INDEX NAME)

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L1      795 SEA FILE=REGISTRY ABB=ON  PLU=ON  TETRAHYDROBORATE OR HYDROBORA
        TE
L2      11 SEA FILE=REGISTRY ABB=ON  PLU=ON  SODIUM BOROHYDRATE?/CN OR
        LITHIUM BOROHYDR?/CN OR POTASSIUM BOROHYDR?/CN
L3      104214 SEA FILE=REGISTRY ABB=ON  PLU=ON  METAL OR METALS OR MAGNESIUM

L4      128483 SEA FILE=REGISTRY ABB=ON  PLU=ON  BORATE
L5      15523 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L1 OR TETRAHYDROBORATE OR
        HYDROBORATE
L6      SEL  PLU=ON  L2 1- CHEM :      52 TERMS
L7      15422 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L6
L8      15583 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L7 OR (SODIUM OR LITHIUM OR
        POTASSIUM) (2A) BOROHYDR?
L9      4137887 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L3 OR METAL OR MAGNESIUM
L10     166954 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L4 OR BORATE
L12     15254 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L10(L) L9
L14     38473 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L10(L) (RCT/RL OR RACT/RL)
L15     250013 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L9(L) (RCT/RL OR RACT/RL)
L16     2579 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L12 AND L14
L17     1952 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L16 AND L15
L18     104576 SEA FILE=REGISTRY ABB=ON  PLU=ON  PALLADIUM/BI
L19     208 SEA FILE=REGISTRY ABB=ON  PLU=ON  PT/MF
L21     513099 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L18 OR L19 OR PALLADIUM OR
        PLATINUM OR PD OR PT
L25     3041 SEA FILE=HCAPLUS ABB=ON  PLU=ON  (L5 OR L8) (L) (PREP?/RL OR
        PREP OR PREPARTION)
L26     78 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L17 AND L25
L27     11 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L26 AND L21
L28     9 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L27 AND PD=<NOVEMBER 25, 2003

L30     524 SEA FILE=HCAPLUS ABB=ON  PLU=ON  (L5 OR L8) (L) (PURIFI?/RL OR
        PURIFI? OR RECOVER?)
L31     152 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L30 AND L10 AND L9
L32     38 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L31 AND L9 AND L21
L33     36 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L32 NOT (L27 OR L28)
L44     294 SEA FILE=HCAPLUS ABB=ON  PLU=ON  "SUDA S"/AU OR "SUDA SEIJIRAU"
        /AU
L45     1522 SEA FILE=HCAPLUS ABB=ON  PLU=ON  LI Z ?/AU OR "LI ZHOUPENG"/AU

L46     52 SEA FILE=HCAPLUS ABB=ON  PLU=ON  "IWASE Y"/AU OR ("IWASE
        YASUTOSHI"/AU OR "IWASE YASUYOSHI"/AU)
L47     8 SEA FILE=HCAPLUS ABB=ON  PLU=ON  ("MORIGASAKI N"/AU OR
        "MORIGASAKI NOBUTO"/AU)
L48     7 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L47 NOT (L33 OR L27 OR L28)
L49     5 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L44 AND L45 AND L46
L50     44 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L44 AND (L45 OR L46)
L51     5 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L45 AND L46
L52     46 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L48 OR L49 OR L50 OR L51
L53     46 SEA FILE=HCAPLUS ABB=ON  PLU=ON  L52 NOT (L33 OR L27 OR L28)

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Valenrod 10\_721479

L53 ANSWER 1 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:1249878 HCAPLUS

DOCUMENT NUMBER: 144:276900

TITLE: Development of the direct borohydride fuel cell

AUTHOR(S): Li, Z. P.; Liu, B. H.; Arai, K.; Suda, S.

CORPORATE SOURCE: Materials & Energy Research Institute Tokyo, Ltd.,  
Chino-shi, Nagano, 391-0301, Japan

SOURCE: Journal of Alloys and Compounds (2005), 404-406,  
648-652

CODEN: JALCEU; ISSN: 0925-8388

PUBLISHER: Elsevier B.V.

DOCUMENT TYPE: Journal; General Review

LANGUAGE: English

AB A review on development of the direct borohydride fuel cells. The theor. energy conversion efficiency of the direct borohydride fuel cell (0.91) is larger than that of the polymer electrolyte membrane fuel cell (0.83). Recently, the cell power d. 290 mW/cm<sup>2</sup> has been achieved. A five-cell stack with an effective area of 67 cm<sup>2</sup> has demonstrated power of 110 W when the operation temperature is 60°, even if the stack operation started at room temperature without humidification.

REFERENCE COUNT: 22 THERE ARE 22 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L53 ANSWER 2 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:1249877 HCAPLUS

TITLE: Production of sodium borohydride by using dynamic behaviors of protide at the extreme surface of magnesium particles

AUTHOR(S): Suda, S.; Morigasaki, N.;  
Iwase, Y.; Li, Z. P.CORPORATE SOURCE: Department of Environmental and Chemical Engineering,  
Chemical Energy Laboratory, Kogakuin University,  
2665-1, Nakano-machi, Hachioji-shi, Tokyo, 192-0015,  
JapanSOURCE: Journal of Alloys and Compounds (2005), 404-406,  
643-647

CODEN: JALCEU; ISSN: 0925-8388

PUBLISHER: Elsevier B.V.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB An advanced process for the production of sodium borohydride ( $\text{NaBH}_4$ ) as a hydrogen storage material was developed, which applied the dynamic hydriding and dehydriding behaviors of protide ( $\text{H}^-$ ) in Mg-H system under transitional temperature conditions. An abundant natural resource named borax ( $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ ) and the anhydrous sodium metaborate ( $\text{NaBO}_2$ ) recovered from the "spent fuel" as  $\text{NaBO}_2 \cdot 4\text{H}_2\text{O}$  were used as the starting material in the present process. Powder-state Mg played an important role in the transitional hydriding and dehydriding process where the gaseous hydrogen was converted to protide at the extreme surface of Mg to form  $\text{NaBH}_4$  in exchange with the simultaneous transition of oxygen in  $\text{NaBO}_2$  to form  $\text{MgO}$ . In the present process, the protide as the most reactive state among the four states of hydrogen is applied for the synthesis of  $\text{NaBH}_4$ , which can exist in metal-hydrogen complexes, such as  $\text{NaAlH}_4$  and  $\text{NaBH}_4$ . The  $\text{NaBH}_4$  yield was reached higher than 90% by a single batch process but was found to be largely dependent on the rate of temperature change and the particle size,

i.e., the sp. surface area of Mg particles.

REFERENCE COUNT: 31 THERE ARE 31 CITED REFERENCES AVAILABLE FOR THIS  
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

Valenrod 10\_721479

L53 ANSWER 3 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:491812 HCAPLUS

DOCUMENT NUMBER: 143:176139

TITLE: Performance improvement of a micro borohydride fuel cell operating at ambient conditions

AUTHOR(S): Liu, B. H.; Li, Z. P.; Arai, K.; Suda, S.

CORPORATE SOURCE: Department of Environmental and Chemical Engineering, Kogakuin University, Hachioji, Tokyo, 192-0015, Japan

SOURCE: Electrochimica Acta (2005), 50(18), 3719-3725

CODEN: ELCAAV; ISSN: 0013-4686

PUBLISHER: Elsevier B.V.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB In this study, aqueous borohydride solns. were employed to fuel a micro cell. Electrochem. performance of the micro borohydride fuel cell was tested at ambient conditions without any auxiliary facilities. Electrochem. impedance spectroscopy analyses were performed to characterize the cell performance. Both anion and cation exchange membranes were tried to sep. the fuel from the cathode. Membrane properties were found to be a decisive factor for cell performance. A maximum power d. of 40 mW/cm<sup>2</sup> at room temperature was achieved when the Nafion NRE211 membrane was used. Hydrogen evolution at the anode side resulting from the competitive hydrolysis reaction influenced cell performance by preventing transfer of the electrolyte. The cell also demonstrated promising performance even when a silver cathode was used.

REFERENCE COUNT: 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L53 ANSWER 4 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN  
ACCESSION NUMBER: 2004:1060839 HCAPLUS  
DOCUMENT NUMBER: 142:25940  
TITLE: Production of alkali metal tetrahydroborates by  
hydrogenation of alkali metal metaborates via alkaline  
earth metal hydride intermediates  
INVENTOR(S): Suda, Seijirau; Li, Zhoupeng;  
Iwase, Yasuyoshi; Morigasaki, Nobuto  
PATENT ASSIGNEE(S): Japan  
SOURCE: U.S. Pat. Appl. Publ., 9 pp., Cont.-in-part of U.S.  
Ser. No. 558,828.  
CODEN: USXXCO  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 2  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 2004249215	A1	20041209	US 2003-721479	20031125
JP 2004224684	A2	20040812	JP 2003-72466	20030317
PRIORITY APPLN. INFO.:			US 2000-558828	A2 20000426
			JP 2002-344426	A 20021127
			JP 2003-72466	A 20030317

AB Alkali metal tetrahydroborates are produced in high yield by reaction of a suitable alkali metal borate (preferably an alkali metal metaborate) with a finely ground alkaline earth metal (preferably magnesium, ground to average particle diameter  $\leq 100 \mu\text{m}$ ) in the presence of  $\text{H}_2$  at below the equilibrium pressure for stable alkaline earth metal hydride formation. The solid reactants are mixed with hydrogen at  $\leq 450^\circ$ , and heated to  $500\text{--}650^\circ$ . Coke-oven gas is a suitable hydrogen source. Alkali metal tetrahydroborates have been suggested as a convenient source of fuel-cell-grade hydrogen.

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L53 ANSWER 5 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN  
ACCESSION NUMBER: 2004:899747 HCAPLUS  
DOCUMENT NUMBER: 143:175994  
TITLE: Sodium hydroborate as a hydrogen storing material  
AUTHOR(S): Suda, Seijirou; **Morigasaki, Nobuto**; Iwase,  
Yasuyoshi; Li. Zhou Peng  
CORPORATE SOURCE: Dep. of Engineering, Kogakuin University, Japan  
SOURCE: Kagaku Sochi (2004), 46(10), 64-71  
CODEN: KASOB7; ISSN: 0368-4849  
PUBLISHER: Kogyo Chosakai  
DOCUMENT TYPE: Journal; General Review  
LANGUAGE: Japanese  
AB A review with 0 refs.

L53 ANSWER 6 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN  
ACCESSION NUMBER: 2004:446908 HCAPLUS  
DOCUMENT NUMBER: 140:409212  
TITLE: Method for producing tetrahydroborates  
INVENTOR(S): Suda, Seijirau; Li, Zhoupeng;  
Iwase, Yasuyoshi; Morigasaki, Nobuto  
PATENT ASSIGNEE(S): Materials & Energy Research Institute Tokyo, Ltd.,  
Japan  
SOURCE: Eur. Pat. Appl., 11 pp.  
CODEN: EPXXDW  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 2  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1424310	A2	20040602	EP 2003-27149	20031126
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
JP 2004224684	A2	20040812	JP 2003-72466	20030317
PRIORITY APPLN. INFO.:			JP 2002-344426	A 20021127
			JP 2003-72466	A 20030317

AB Tetrahydroborates, such as  $\text{NaBH}_4$ ,  $\text{LiBH}_4$ , and  $\text{KBH}_4$ , are prepared by reacting a powdery mixture containing a borate and magnesium in a hydrogen atmospheric under pressure at 500-650°. The hydrogen source can be coke oven gas. The reaction can be carried out in the presence of a hydrogenation catalyst. The starting materials have an average particle diameter of < 100  $\mu\text{m}$ .

L53 ANSWER 7 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2004:306656 HCAPLUS

DOCUMENT NUMBER: 141:210022

TITLE: Metal-hydrogen complex compounds as hydrogen storage materials

AUTHOR(S): Suda, S.; Iwase, Y.;  
Morigasaki, N.; Li, Z.-P.

CORPORATE SOURCE: Department of Environmental & Chemical Engineering,  
Kogakuin University, Hachioji, 192-0015, Japan

SOURCE: Advanced Materials for Energy Conversion II,  
Proceedings of a Symposium held during the TMS Annual  
Meeting, 2nd, Charlotte, NC, United States, Mar.  
14-18, 2004 (2004), Meeting Date 2004, 123-133.  
Editor(s): Chandra, Dhanesh; Bautista, Renato G.;  
Schlapbach, Lous. Minerals, Metals & Materials  
Society: Warrendale, Pa.  
CODEN: 69FHAF; ISBN: 0-87339-574-3

DOCUMENT TYPE: Conference

LANGUAGE: English

AB A new production process for NaBH<sub>4</sub> as H storage material was developed by  
using NaBO<sub>2</sub>, according to  $\text{NaBO}_2 + 2\text{Mg} + 2\text{H}_2 \rightarrow \text{NaBH}_4 + 2\text{MgO}$  at a  
fast reaction rate by changing the temperature of the system dynamically. The  
process uses the transitional states of H at the surface of Mg when it is  
hydrogenated and dehydrogenated at a constant rate of temperature change,  
dT/dt.

The rate of conversion is dependent on dT/dt and is regulated by the  
extent of oxidation of the Mg particles. The role of H<sup>-</sup> in Mg·(2H<sup>-</sup>)  
under transient conditions,  $\text{Mg} + \text{H}_2 \rightarrow \text{MgH}_2 \rightarrow \text{Mg}$   
·(2H<sup>-</sup>), is discussed with regard to the exchange reaction between  
NaBO<sub>2</sub> and NaBH<sub>4</sub>.

REFERENCE COUNT: 30 THERE ARE 30 CITED REFERENCES AVAILABLE FOR THIS  
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT



L53 ANSWER 8 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2004:83205 HCAPLUS

DOCUMENT NUMBER: 140:256177

TITLE: Evaluation of alkaline borohydride solutions as the fuel for fuel cell

AUTHOR(S): Li, Z. P.; Liu, B. H.; Arai, K.; Asaba, K.; Suda, S.

CORPORATE SOURCE: Department of Environmental &amp; Chemical Engineering, Kogakuin University, Hachioji-shi, Tokyo, 192-0015, Japan

SOURCE: Journal of Power Sources (2004), 126(1-2), 28-33  
CODEN: JPSODZ; ISSN: 0378-7753

PUBLISHER: Elsevier Science B.V.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A fuel cell was assembled using alkaline borohydride solns. as the fuel. The sp. gr., sp. viscosity, and m.ps. of the borohydride solns. were evaluated. With increasing the NaBH<sub>4</sub> concentration, the sp. gr. was decreased but the viscosity was increased consistently. The effects of NaBH<sub>4</sub> and NaOH concns. on the cell and electrode polarizations were investigated. The increase of NaBH<sub>4</sub> concentration improved the anode performance only a little

but significantly increased the cathode polarization due to the BH<sub>4</sub>-crossover. As a result, the cell polarization increased when using highly concentrated borohydride solns. Based on the Nernst's equation, the increase

of NaOH concentration is favorable for the anode, but detrimental to the cathode polarization. In principle, the cell polarization has nothing to do with the NaOH concentration according to the cell reaction  $\text{NaBH}_4 + \text{O}_2 = \text{NaBO}_2 + 2\text{H}_2\text{O}$ .

However, the exptl. results showed that the high concentration of NaOH affected the cell polarization at higher current densities.

REFERENCE COUNT: 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

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L53 ANSWER 9 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2003:601030 HCAPLUS

DOCUMENT NUMBER: 139:309993

TITLE: Protide compounds in hydrogen storage systems

AUTHOR(S): **Li, Z. P.**; Liu, B. H.; Arai, K.; Morigazaki, N.; **Suda, S.**

CORPORATE SOURCE: Department of Environmental and Chemical Engineering,  
Kogakuin University, Hachioji-shi, Tokyo, 192-0015,  
Japan

SOURCE: Journal of Alloys and Compounds (2003), 356-357,  
469-474

CODEN: JALCEU; ISSN: 0925-8388

PUBLISHER: Elsevier Science B.V.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Based on 3 chemical states of hydrogen, H<sup>-</sup>, H<sup>0</sup> and H<sup>+</sup>, a triangular H energy system is proposed. The energy transfer between the 3 states is discussed. Expts. prove that NaBH<sub>4</sub> as a H<sup>-</sup> carrier can release its energy directly through a borohydride fuel cell or generate H<sub>2</sub> for polymer electrolyte membrane fuel cells. The used fuel, Na meta-borate, can be converted back to NaBH<sub>4</sub> through a reaction with MgH<sub>2</sub>.

REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L53 ANSWER 10 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2003:458475 HCAPLUS  
 DOCUMENT NUMBER: 139:216877  
 TITLE: A Fuel Cell Development for Using Borohydrides as the Fuel  
 AUTHOR(S): Li, Z. P.; Liu, B. H.; Arai, K.; Suda, S.  
 CORPORATE SOURCE: Department of Environmental and Chemical Engineering, Kogakuin University, Nakano-machi 2665-1, Hachioji-shi, Tokyo, 192-0015, Japan  
 SOURCE: Journal of the Electrochemical Society (2003), 150(7), A868-A872  
 CODEN: JESOAN; ISSN: 0013-4651  
 PUBLISHER: Electrochemical Society  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB A fuel cell was developed using borohydride solns. as the fuel. The cell consisted of an anode made of a Zr-Ni alloy, a cathode made of Pt/C, and a Na<sup>+</sup> form Nafion membrane as the electrolyte. The borohydride-fueled cell showed an open-circuit voltage of 1.3 V, compared with 1.0 V for a hydrogen gas-fueled one. The anode exhibited a small polarization property compared with the cathode. The cathode polarization was the main reason for the cell voltage drop with increasing currents. When a Nafion membrane was used as the electrolyte, cations (Na<sup>+</sup>) were the charge carrier in it. Compared with Nafion 112 membrane, Nafion 117 membrane demonstrated a considerable resistance to borohydride crossover and resulted in acceptable cell performance. However, there are several problems such as H<sub>2</sub> evolution during operation, BH<sub>4</sub><sup>-</sup> crossover, NaOH accumulation at the cathode, and NaBO<sub>2</sub> accumulation at the anode in recent systems. Further effort is needed to develop the fuel cell using borohydrides as the fuel.  
 REFERENCE COUNT: 15 THERE ARE 15 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

Valenrod 10\_721479

L53 ANSWER 11 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2003:324965 HCAPLUS

DOCUMENT NUMBER: 139:103130

TITLE: Preparation of potassium borohydride by a  
mechano-chemical reaction of saline hydrides with  
dehydrated borate through ball milling

AUTHOR(S): Li, Zhou Peng; Liu, Bin Hong; **Morigasaki,**  
**Nobuto**; Suda, Sejirau

CORPORATE SOURCE: Department of Environmental and Chemical Engineering,  
Kogakuin University, Hachioji-shi, Tokyo, 192-0015,  
Japan

SOURCE: Journal of Alloys and Compounds (2003), 354(1-2),  
243-247

CODEN: JALCEU; ISSN: 0925-8388

PUBLISHER: Elsevier Science B.V.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A convenient method was developed to synthesize potassium borohydride by a  
mechanochem. reaction of saline hydrides with dehydrated borates using a  
planetary ball mill. Among the tested saline hydrides,  $MgH_2$  was the most  
effective reactant for borohydride formation. In order to improve the  
borohydride yield, it was necessary to add an excess amount of  $MgH_2$ . When a  
35% excess of  $MgH_2$  was added, potassium borohydride yield reached 100%.  
The borohydride formation was strongly dependent on the water content in  
reactants. When the water content in  $KBO_2$  samples was >24.8 weight%

(equivalent

to  $KBO_2 \cdot 1.5H_2O$ ), no borate was converted into borohydride by the  
mechanochem. reaction.

REFERENCE COUNT: 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS  
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L53 ANSWER 12 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2003:99330 HCAPLUS

DOCUMENT NUMBER: 138:371547

TITLE: A study on recycle of borohydride liquid fuel

AUTHOR(S): Morigasaki, Nobuto; Tanisawa, Kazuhiro;

Li, Zhoupeng; Suda, Seijirau

CORPORATE SOURCE: Graduate School of Applied Chemistry and Chemical Engineering, Kogakuin University, Tokyo, Japan

SOURCE: Kogakuin Daigaku Kenkyu Hokoku (2002), 93, 55-59

CODEN: KDKHAY; ISSN: 0368-5098

PUBLISHER: Kogakuin Daigaku

DOCUMENT TYPE: Journal

LANGUAGE: Japanese

AB Borohydrides can be formed by the reaction of anhydrous metaborate with Mg hydride. However, the borohydride conversion rate was influenced by the metaborate source. Anhydrous sodium metaborate can be produced by dehydrating the  $\text{NaBO}_2 \cdot 4\text{H}_2\text{O}$  crystals from used fuel or the commercialized  $\text{NaBO}_2 \cdot 4\text{H}_2\text{O}$ . The  $\text{NaBH}_4$  conversion rate based on  $\text{NaBO}_2$  from used fuel was lower than that based on the anhydrous borate form the commercialized  $\text{NaBO}_2 \cdot 4\text{H}_2\text{O}$ . It was because the sample obtained from used fuel was not completely dehydrated.

L53 ANSWER 13 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2003:99329 HCAPLUS

DOCUMENT NUMBER: 138:371546

TITLE: The electric discharge mechanism of the liquid type  
fuel cell using borohydride complex ion

AUTHOR(S): Arai, Kunihito; Chiku, Satoshi; **Li, Zhoupeng**  
; **Suda, Seijirau**

CORPORATE SOURCE: Materials & Energy Research Institute Tokyo, Ltd.,  
Japan

SOURCE: Kogakuin Daigaku Kenkyu Hokoku (2002), 93, 49-53

CODEN: KDKHAY; ISSN: 0368-5098

PUBLISHER: Kogakuin Daigaku

DOCUMENT TYPE: Journal

LANGUAGE: Japanese

AB In this liquid type fuel cell using borohydride complex ion (called "BFC"),  
it was found that alkaline type reactions had occurred at each electrode,  
though this fuel cell used the pos. ion exchange membrane (i.e. an acid  
membrane) as the electrolyte. These reactions are involved in the fact  
that K<sup>+</sup> ion which exists so much at an anode side moved in the electrolyte  
as an elec. charge carrier. Moreover, when we used the fluorinated metal  
hydride as an anode catalyst, we obtained potential as much as Pd.

L53 ANSWER 14 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2003:99328 HCAPLUS

DOCUMENT NUMBER: 138:355708

TITLE: A review on the methods of synthesis of alkali metal borohydrides

AUTHOR(S): Iwase, Yasuyoshi; Li, Zhoupeng;  
Suda, Seijirau

CORPORATE SOURCE: Materials & Energy Research Institute Tokyo, Ltd.,  
Japan

SOURCE: Kogakuin Daigaku Kenkyu Hokoku (2002), 93, 43-48  
CODEN: KDKHAY; ISSN: 0368-5098

PUBLISHER: Kogakuin Daigaku

DOCUMENT TYPE: Journal; General Review

LANGUAGE: Japanese

AB A review of articles and patents on the synthesis methods of alkali metal borohydrides to explore the required conditions for new and more economical methods of producing the alkali metal borohydrides. Based on this overview and our experiment results, we determined the conditions to synthesize

borohydrides (BH<sub>4</sub><sup>-</sup>) from borate salts: (a) reaction proceeds under anhydrous condition or in aprotic solvent and (b) borate salts react with other protide compds. (H<sup>-</sup>) to form BH<sub>4</sub><sup>-</sup>, but never form BH<sub>4</sub><sup>-</sup> with proton.

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L53 ANSWER 15 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2002:972505 HCAPLUS

DOCUMENT NUMBER: 138:347880

TITLE: Preparation of sodium borohydride by the reaction of  
MgH<sub>2</sub> with dehydrated borax through ball milling at  
room temperature

AUTHOR(S): Li, Z. P.; Morigazaki, N.; Liu, B. H.;  
Suda, S.

CORPORATE SOURCE: Department of Environmental and Chemical Engineering,  
Kogakuin University, Hachioji-shi, Tokyo, 192-0015,  
Japan

SOURCE: Journal of Alloys and Compounds (2003), 349(1-2),  
232-236

CODEN: JALCEU; ISSN: 0925-8388

PUBLISHER: Elsevier Science B.V.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A convenient method was developed to synthesize NaBH<sub>4</sub> by the reaction of  
MgH<sub>2</sub> with Na<sub>2</sub>B<sub>4</sub>O<sub>7</sub> through ball milling at room temperature To improve the Na  
borohydride yield, Na compds. were added to compensate the Na  
insufficiency in reactants when MgH<sub>2</sub> instead of NaH was used as the  
reducing agent. Na<sub>2</sub>CO<sub>3</sub> addition was better than NaOH or Na<sub>2</sub>O<sub>2</sub> addition in  
increasing the borohydride yield.

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS  
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT



L53 ANSWER 16 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2002:95069 HCAPLUS  
 DOCUMENT NUMBER: 136:312397  
 TITLE: Effects of surface structure of fluorinated AB2 alloys  
 on their electrodes and battery performances  
 AUTHOR(S): Li, Z. P.; Liu, B. H.; Hitaka, K.;  
 Suda, S.  
 CORPORATE SOURCE: Department of Environmental and Chemical Engineering,  
 Kogakuin University, Hachioji, 192-0015, Japan  
 SOURCE: Journal of Alloys and Compounds (2002), 330-332,  
 776-781  
 CODEN: JALCEU; ISSN: 0925-8388  
 PUBLISHER: Elsevier Science S.A.  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB Fluorination technique effectively improve the activation property and  
 rate discharge capabilities of AB2 alloys. In this paper, the performance  
 of sealed batteries using fluorinated AB2 alloys were investigated.  
 Compared with the sealed battery using untreated AB2 alloys, those using  
 fluorinated AB2 alloys showed better activation property, longer cycle  
 life and higher rate discharge capacity. The rate discharge capacity of  
 the sub-C sealed battery using duplicated fluorination treated AB2 alloys  
 reached up to 2.3 AH at 4C (10.4A). The batteries using fluorinated AB2  
 alloys sustained over 300 cycles at 0.2C rate, but its discharge capacity  
 degraded quickly when being cycled at 1C rate.  
 REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS  
 RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L53 ANSWER 17 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2001:300367 HCAPLUS

DOCUMENT NUMBER: 135:95104

TITLE: Fluorinated metal hydrides for the catalytic hydrolysis of metal-hydrogen complexes

AUTHOR(S): Suda, S.; Sun, Y.-M.; Uchida, M.; Liu, B.-H.; Mormitu, S.; Arai, K.; Zhou, Y.; Tsukamoto, N.; Candra, Y.; Li, Z.-P.

CORPORATE SOURCE: Chemical Energy Laboratory, Kogakuin University, Tokyo, 192-0015, Japan

SOURCE: Metals and Materials International (2001), 7(1), 73-75  
CODEN: MMIECY

PUBLISHER: Korean Institute of Metals and Materials

DOCUMENT TYPE: Journal

LANGUAGE: English

AB This paper is related to the hydrogen storage (H-storage) system composed of an alkaline solution that contains metal-hydrogen complex ions. The  $BH_4^-$ -complex ions stabilized when dissolved in aqueous KOH or NaOH to form homogeneous solns. However, it is necessary to apply an appropriate catalyst for a high rate generation of hydrogen under atmospheric pressure and temperature conditions. The authors intended to develop catalysts suitable for the hydrolysis of  $BH_4^-$ -complex ion solns. and found that  $Mg_2Ni$  exhibits excellent catalytic functions in the hydrolysis, in particular, after the fluorination treatment (F-treatment). In this work, the effects of F-treatment on the rates of hydrolysis were evaluated for the hydrided and unhydrided  $Mg_2Ni$ . No hydrogenation in addition to F-treatment is required in view of hydrolysis kinetics and cost-effectiveness.

REFERENCE COUNT: 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L53 ANSWER 18 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2001:206623 HCAPLUS

DOCUMENT NUMBER: 134:313607

TITLE: Catalytic generation of hydrogen by applying fluorinated-metal hydrides as catalysts

AUTHOR(S): Suda, S.; Sun, Y.-M.; Liu, B.-H.; Zhou, Y.; Morimitsu, S.; Arai, K.; Tsukamoto, N.; Uchida, M.; Candra, Y.; Li, Z.-P.

CORPORATE SOURCE: Chemical Energy Laboratory, Department of Environmental and Chemical Engineering, Kogakuin University, Hachioji, 192-0015, Japan

SOURCE: Applied Physics A: Materials Science &amp; Processing (2001), 72(2), 209-212

CODEN: APAMFC; ISSN: 0947-8396

PUBLISHER: Springer-Verlag

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Metal-hydrogen complexes such as  $\text{NaAlH}_4$ ,  $\text{KBH}_4$ , and  $\text{NaBH}_4$  are known as high H-content materials. The highly reactive natures of these materials against moist air and water can be easily stabilized in aqueous KOH and NaOH solns. Accordingly, it is required to develop catalysts suitable for generating hydrogen from the stabilized metal-hydrogen complexes in alkaline solns. This work is aimed at developing catalysts that can generate hydrogen from such solns. with considerably high kinetics under moderate temperature and pressure conditions. We have found that  $\text{Mg}_2\text{Ni}$ , a typical high-temperature hydriding alloy, exhibits excellent functions as a catalyst for the hydrolysis of  $\text{BH}_4^-$ -ion-containing solns. The fluorination-treatment (F-treatment) effects on granular particles of  $\text{Mg}_2\text{Ni}$  and  $\text{Mg}_2\text{NiH}_4$  are reported in this paper.

REFERENCE COUNT: 39 THERE ARE 39 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

Valenrod 10\_721479

L53 ANSWER 19 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2001:88882 HCAPLUS

DOCUMENT NUMBER: 134:298330

TITLE: Effects of fluorination of AB2-type alloys and of mixing with AB5-type alloys on the charge-discharge characteristics

AUTHOR(S): Higuchi, E.; Toyoda, E.; Li, Z. P.;

Suda, S.; Inoue, H.; Nohara, S.; Iwakura, C.

CORPORATE SOURCE: Faculty of Engineering, Department of Environmental and Chemical Engineering, Chemical Energy Lab, Kogakuin University, Hachioji-shi, Tokyo, 192-0015, Japan

SOURCE: Electrochimica Acta (2001), 46(8), 1191-1194

CODEN: ELCAAV; ISSN: 0013-4686

PUBLISHER: Elsevier Science Ltd.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The effects of fluorination (F-treatment) of AB2-type Laves-phase  $\text{Zr}_{0.9}\text{Ti}_{0.1}\text{V}_{0.2}\text{Mn}_{0.6}\text{Co}_{0.1}\text{Ni}_{1.1}$  (AB2) alloys and of mixing with untreated AB5-type  $\text{MmNi}_{3.68}\text{Co}_{0.78}\text{Mn}_{0.36}\text{Al}_{0.28}$  (AB5) alloys on their charge-discharge characteristics were investigated. The F-treatment of the AB2 alloy greatly increased initial activation rate and discharge capacity and slightly improved high-rate dischargeability. The mixing of the F-treated AB2 alloy with untreated AB5 (<25  $\mu\text{m}$ ) alloy decreased somewhat the maximum discharge capacity compared to the fluorinated AB2 alloy but it greatly improved the high-rate dischargeability. In particular, the high-rate dischargeability for the AB2(F)-AB5 (<25  $\mu\text{m}$ ) mixture pos. deviated from the estimated values based on the maximum discharge capacity for both alloys

and

their content, suggesting that the AB5 alloy can work as a catalyst for dehydriding the AB2 alloy hydride besides as a hydrogen reservoir; a synergistic effect appeared by the mixing.

REFERENCE COUNT: 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L53 ANSWER 20 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2000:147662 HCAPLUS

DOCUMENT NUMBER: 132:200265

TITLE: Effects of fluorination temperature on surface structure and electrochemical properties of AB2 electrode alloys

AUTHOR(S): Li, Z. P.; Higuchi, E.; Liu, B. H.; Suda, S.

CORPORATE SOURCE: Department of Environmental and Chemical Engineering, Kogakuin University, Hachioji, 192-0015, Japan

SOURCE: Electrochimica Acta (2000), 45(11), 1773-1779

CODEN: ELCAAV; ISSN: 0013-4686

PUBLISHER: Elsevier Science Ltd.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB In order to accelerate the activation of AB2 electrode alloys, a new fluorination treatment has been developed which removes oxides from alloy surfaces and implants metallic Ni into the alloy surface layer. The behavior of Ni during fluorination treatment depends strongly on the treatment temperature. The constituent Ni of the alloy dissolves into the treatment solution at a low temperature, but Ni complex ion in treatment solution is

chemical reduced by constituent elements at a high temperature. The temperature is the

key factor of the fluorination treatment. The electrochem. properties were improved through increasing the treatment temperature due to the Ni implantation into surface layer.

REFERENCE COUNT: 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L53 ANSWER 21 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2000:6032 HCAPLUS

DOCUMENT NUMBER: 132:95674

TITLE: Electrochemical properties and characteristics of a fluorinated AB<sub>2</sub>-alloy

AUTHOR(S): Li, Z. P.; Higuchi, E.; Liu, B. H.; Suda, S.

CORPORATE SOURCE: Department of Environmental & Chemical Engineering, Kogakuin University, Hachioji, 192-0015, Japan

SOURCE: Journal of Alloys and Compounds (1999), 293-295, 593-600

CODEN: JALCEU; ISSN: 0925-8388

PUBLISHER: Elsevier Science S.A.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A series of fluorination techniques have been developed in this laboratory to improve the surface condition of AB<sub>2</sub> alloy. The fluorination was found effective for removing oxide layer and implanting catalytic Ni to the alloy surfaces. The developed fluorination techniques improved considerably the initial activation characteristics, decreased the electrochem. reaction impedance and increased the rate capacity of AB<sub>2</sub> electrodes.

REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L53 ANSWER 22 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 1999:482282 HCAPLUS  
 DOCUMENT NUMBER: 131:274162  
 TITLE: Fluorinated Laves-AB2 alloy as the negative electrode  
 in Ni-MH battery  
 AUTHOR(S): Higuchi, Eiji; Miyoshi, Hirokazu; Sugimoto, Hiroyuki;  
 Li, Zhoupeng; Suda, Seijirau  
 CORPORATE SOURCE: Grad. Sch. Ind. Chem., Kogakuin Univ., Tokyo,  
 163-8677, Japan  
 SOURCE: Kogakuin Daigaku Kenkyu Hokoku (1999), 86, 69-75  
 CODEN: KDKHAY; ISSN: 0368-5098  
 PUBLISHER: Kogakuin Daigaku  
 DOCUMENT TYPE: Journal  
 LANGUAGE: Japanese

AB AB5 hydriding alloys as neg. electrode materials have been well developed for Ni-MH battery. Many scientists have paid attention to AB2 alloy due to the high-capacity of AB2 alloy compared with AB5 alloy. However, AB2 alloy usually showed poor activation and kinetic properties. It is possible to overcome these shortcomings by surface modification through fluorination. Aiming for practical use, we investigated the performances of practical electrode of fluorinated AB2 alloy to improve the rate of discharge capability and cycle life. It is found that the connection of lead line to electrode conductor of the electrode, and the pore size of the Ni foam exerted the big influence on electrode properties.

L53 ANSWER 23 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1999:482280 HCAPLUS

DOCUMENT NUMBER: 131:274160

TITLE: Effects of the fluorination treatment on the surface structure and electrochemical properties of Zr-based AB2-type hydriding alloys

AUTHOR(S): Okutsu, Akira; Nakamura, Kazuhiro; Li, Zhoupeng; Suda, Seijirau

CORPORATE SOURCE: Grad. Sch. Ind. Chem., Kogakuin Univ., Tokyo, 163-8677, Japan

SOURCE: Kogakuin Daigaku Kenkyu Hokoku (1999), 86, 57-62  
CODEN: KDKHAY; ISSN: 0368-5098

PUBLISHER: Kogakuin Daigaku

DOCUMENT TYPE: Journal

LANGUAGE: Japanese

AB AB5 alloys have been used in Ni-MH battery as neg. electrode materials. In this work, the activation and reactivity of Zr-based AB2 alloys whose capacities were larger than AB5 alloys, have been improved by fluorination. The effects of fluorination technique combining with plenary ball milling on electrochem. properties have been investigated to improve performances of AB2 alloys for developing the high power secondary battery of elec. vehicle. It was found that oxides can be removed from alloy surfaces while metallic Ni can be implanted to alloy surfaces so that the sp. surface area of the fluorinated AB2 alloy was increased. The electrochem. activation, high rate charge and discharge capability were improved through surface modification by fluorination.



L53 ANSWER 24 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN  
ACCESSION NUMBER: 1998:544811 HCAPLUS  
DOCUMENT NUMBER: 129:163814  
TITLE: Surface passivation of metal hydrides for applications  
AUTHOR(S): Suda, S.; Li, Z.-P.; Sun, Y.-M.;  
Liu, B.-H.; Gao, X.-P.  
CORPORATE SOURCE: Department of Environmental & Chemical Engineering,  
Kogakuin University, Tokyo, 192-0015, Japan  
SOURCE: Materials Research Society Symposium Proceedings  
(1998), 513 (Hydrogen in Semiconductors and Metals),  
25-36  
CODEN: MRSPDH; ISSN: 0272-9172  
PUBLISHER: Materials Research Society  
DOCUMENT TYPE: Journal; General Review  
LANGUAGE: English  
AB A review with many refs. Properties and characteristics of hydriding  
alloys are strongly dependent on surface compns. and morphologies. For  
instance, oxides such as La<sub>2</sub>O<sub>3</sub> on AB<sub>5</sub> alloys and ZrO<sub>2</sub> on AB<sub>2</sub>, AB, and  
body-centered-cubic (BCC) alloys act as the barriers for the conversion of  
mol. and ionic hydrogen to atomic hydrogen at the surface, thus reducing the  
kinetics in both the gas-solid and electrochem. reactions. Alloy surfaces  
chemical treated by an aqueous F-ion containing solution have been developed  
to solve  
such problems. F-treated surfaces exhibit significantly improved  
characteristics in regard to the hydrogen uptakes and the protection  
against impurities and electrolyte solution. In addition, highly conductive  
metallic Ni layers can be formed on the surface of the alloy particles by  
the fluorination. The authors report the properties and characteristics  
of fluorinated hydriding alloys, mainly of a typical AB<sub>2</sub> Laves phase  
material which represents the difficult activation characteristics and  
poor long-term durability during electrochem. charge/discharge cycles.  
REFERENCE COUNT: 34 THERE ARE 34 CITED REFERENCES AVAILABLE FOR THIS  
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L53 ANSWER 25 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1998:51782 HCAPLUS

DOCUMENT NUMBER: 128:117289

TITLE: The effects of fluorination solution composition on  
the electrochemical properties of  
Zr<sub>0.9</sub>Ti<sub>0.1</sub>V<sub>0.2</sub>Mn<sub>0.6</sub>Co<sub>0.1</sub>Ni<sub>1.1</sub> alloy

AUTHOR(S): Higuchi, Eiichi; Sakasita, Masaya; Li, Zhoupeng  
; Suda, Seijirau

CORPORATE SOURCE: Dep. Ind. Chem., Kogakuin Univ., Tokyo, 163-91, Japan

SOURCE: Kogakuin Daigaku Kenkyu Hokoku (1997), 83, 27-30

CODEN: KDKHAY; ISSN: 0368-5098

PUBLISHER: Kogakuin Daigaku

DOCUMENT TYPE: Journal

LANGUAGE: Japanese

AB Effects of components of fluorination treatment solution on discharge  
properties of Zr-based AB<sub>2</sub>-type alloy Zr<sub>0.9</sub>Ti<sub>0.1</sub>V<sub>0.2</sub>Mn<sub>0.6</sub>Co<sub>0.1</sub>Ni<sub>1.1</sub> were  
studied. It was found that Ni amount implanted on the hydriding alloy  
surface showed significant effects on the discharge capacity. The element  
dissoln. in the alloy during the treatment also showed similar effects.

L53 ANSWER 26 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1998:51781 HCAPLUS

DOCUMENT NUMBER: 128:117288

TITLE: The effects of fluorination treatment on the  
electrochemical properties of Zr-based AB2-type  
hydriding alloys

AUTHOR(S): Okutsu, Akira; Sakasita, Masaya; Li, Zhoupeng  
; Suda, Seijirau

CORPORATE SOURCE: Dep. Ind. Chem., Kogakuin Univ., Tokyo, 163-91, Japan

SOURCE: Kogakuin Daigaku Kenkyu Hokoku (1997), 83, 23-26

CODEN: KDKHAY; ISSN: 0368-5098

PUBLISHER: Kogakuin Daigaku

DOCUMENT TYPE: Journal

LANGUAGE: Japanese

AB Fluorination treatment effects on discharge properties of Zr-based  
AB2-type hydriding alloys were studied. It was found that electrochem.  
activation properties could be improved and discharge capacity could be  
increased by implanting Ni on the surfaces of the hydriding alloys through  
the fluorination treatment.

L53 ANSWER 27 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1997:456292 HCAPLUS

DOCUMENT NUMBER: 127:164304

TITLE: Fluorination mechanism and its effects on the electrochemical properties of metal hydrides

AUTHOR(S): Sakashita, M.; Li, Z. P.; Suda, S.

CORPORATE SOURCE: Department of Chemical Engineering, Kogakuin University, Nakano-machi 2665-1, Hachioji-shi, Tokyo, 192, Japan

SOURCE: Journal of Alloys and Compounds (1997), 253-254, 500-505

CODEN: JALCEU; ISSN: 0925-8388

PUBLISHER: Elsevier

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Fluorination of hydriding alloys has been found effective for improving durability and initial discharge characteristics of hydride electrodes in Ni-MH rechargeable batteries. However, it has also been found that it decreases the discharge capacity because of the fluoride formed on the surface which decreases the elec. conductivity of the electrode. A more

advanced

technique has been developed in this laboratory to implant metallic Ni in the fluoride layer to form a functionally graded surface layer. The proposed fluorination technique considerably improves the durability and initial activation characteristics of AB5-types of hydride, electrodes and also the initial activation characteristics of AB2 electrodes. The fluorination was found effective for removing the oxide layer which acts as an impedance to electrochem. hydrogen uptake.

REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L53 ANSWER 28 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1996:430623 HCAPLUS

DOCUMENT NUMBER: 125:92484

TITLE: An investigation of Ca-based hydride electrode materials

AUTHOR(S): Li, Z. P.; Matsuoka, T.; Suda, S.

CORPORATE SOURCE: Dep. Chem. Eng., Kogakuin Univ., Tokyo, 192, Japan

SOURCE: Vacuum (1996), 47(6-8, Proceedings of the 13th International Vacuum Congress and the 9th International Conference on Solid Surfaces, 1995), 893-897

CODEN: VACUAV; ISSN: 0042-207X

PUBLISHER: Elsevier

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The effects of La-substitution for Ca in  $\text{Ca}_{1-x}\text{La}_x\text{Ni}_{5.7}\text{Al}_{0.3}$  on metallog., structure and electrochem. properties have been investigated. It was found that Ca and Al segregated over the grain boundaries of the alloys. Based on La substituted  $\text{CaNi}_5$ -type alloys, we studied the Zr and Ti addition effects as well. It was found that Zr-Ni phases or Ti-Ni phases deposited on the boundaries of AB5 phase improved the anti-corrosion property of the alloys. Annealing improves the electrochem. durability of the  $\text{Ca}_{1-x}\text{La}_x\text{Ni}_{4.7}\text{Al}_{0.3}$  alloys by reducing A2B7 phase and Ca segregation on the grain boundary.

L53 ANSWER 29 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1996:199099 HCAPLUS

DOCUMENT NUMBER: 124:265514

TITLE: A new family of hydride electrode materials based on  
CaNi<sub>5</sub>-type alloys

AUTHOR(S): Matsuoka, Takashi; Li, Zhoupeng; Uchida,  
Masaki; Suda, Seijirau

CORPORATE SOURCE: Kogakuin Univ., Tokyo, 163-91, Japan

SOURCE: Kogakuin Daigaku Kenkyu Hokoku (1995), 78, 85-7

CODEN: KDKHAY; ISSN: 0368-5098

PUBLISHER: Kogakuin Daigaku

DOCUMENT TYPE: Journal

LANGUAGE: Japanese

AB Charge-discharge characteristic of Ca<sub>1-x</sub>A<sub>x</sub>Ni<sub>5-y-z</sub>M<sub>y</sub>N<sub>z</sub> (A = La, Ce, Mg, Sr;  
M = Sn, Si, Co; N = Al; 0 ≤ x, y, z ≤ 1) hydride electrode were  
examined. The discharge capacity of the Ca-based alloys was 300-350 mAh/g at  
discharge current of 150 mA/g and was lower than that of CaNi<sub>5</sub>. In  
comparison to the M and/or N substitution, A substitution was effective on  
the improvement of cycling durability and kept the discharge capacity at a  
high level. The most durable electrodes were obtained with A = La and x =  
0.6.

L53 ANSWER 30 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1996:106282 HCAPLUS

DOCUMENT NUMBER: 124:180993

TITLE: The Ni content and F-treatment effects on the electrochemical cycling behavior of  $Zr_{0.5}Ti_{0.5}Ni_x$  alloys

AUTHOR(S): Li, Zhoupeng; Takiguchi, Katsutoshi; Suda, Seijirau

CORPORATE SOURCE: Kogakuin Univ., Tokyo, 163-91, Japan

SOURCE: Kogakuin Daigaku Kenkyu Hokoku (1995), 78, 81-4

CODEN: KDKHAY; ISSN: 0368-5098

PUBLISHER: Kogakuin Daigaku

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The alloys were prepared through arc melting of pure metals and pulverized to 26  $\mu m$  and the powders were treated with F ion-containing solution. With increasing of Ni content in the alloy of  $x = 1.25-1.675$ , the discharge capacity increased and the electrochem. activation became easier, but with further addition of Ni discharge capacity decreased. The alloys of high content of Ni ( $x = 1.5-1.675$ ) had higher discharge capacity but the alloys of lower capacity had better durability. F-treatment of alloys containing low Ni as  $x \leq 1.25$  decreased discharge capacity because of decrease of Ni content at the surface.

L53 ANSWER 31 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1996:106281 HCAPLUS

DOCUMENT NUMBER: 124:180992

TITLE: Effects of hydriding-dehydriding cycling on the P-C-T and electrochemical properties of  $\text{Ca}_{1-x}\text{La}_x\text{Ni}_{4.7}\text{Al}_{0.3}$  alloys

AUTHOR(S): Li, Zhoupeng; Suda, Seijirau

CORPORATE SOURCE: Kogakuin Univ., Tokyo, 163-91, Japan

SOURCE: Kogakuin Daigaku Kenkyu Hokoku (1995), 78, 77-80

CODEN: KDKHAY; ISSN: 0368-5098

PUBLISHER: Kogakuin Daigaku

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Electrodes were made through mixing the alloys of  $x = 0-0.6$  with Ni and PTFE in weight ratio of 5:15:1 and through packing in Ni grid and pressing under 4 ton/cm<sup>2</sup> to pellets of 13 mm dia. in 1.5 mm thickness. The cycling was done for composition of charge of 200 mA/g of 3 h and discharge of 150 mA/g in 6M KOH of 20° to 1.0 V vs. Ni/Ni hydroxide electrode. For XRD pellets of alloy/PTFE of 5/1 weight/weight were prepared After 40 cycles of hydriding/dehydriding at 40° no CaH<sub>2</sub> signal was found. From P-C-T properties degradation of capacity was not observed after 50 cycles. La-substituted Ca-based alloys showed strong anti-disproportionation tendency to stabilize the lattice.



L53 ANSWER 32 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1996:71040 HCAPLUS

DOCUMENT NUMBER: 124:152479

TITLE: The annealing effect on the durabilities of La substituted CaNi<sub>5</sub>-type alloys

AUTHOR(S): Li, Zhoupeng; Nagai, Susumu; Suda, Seijirau

CORPORATE SOURCE: Kogakuin Univ., Tokyo, 163-91, Japan

SOURCE: Kogakuin Daigaku Kenkyu Hokoku (1995), 78, 71-5  
CODEN: KDKHAY; ISSN: 0368-5098

PUBLISHER: Kogakuin Daigaku

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The annealing effects of Ca-La series alloys on homogenization and durability improvement were investigated, using x-ray diffraction, microg., and electrochem. measurement. The annealing was good for homogenization but showed no effect on the electrochem. durability of the La-free Ca-based alloy. When La-substituted CaNi<sub>5</sub> type alloy was annealed at 900°C for 3 h., the phase structure changed a little, but the electrochem. durability was improved. Higher temperature and longer time annealing was effective for the electrochem. cycling durability of the Ca-La series alloys. The discharge capacity of the annealed alloys decreased because of the vaporizing of Ca during annealing for a long time.

L53 ANSWER 33 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1996:44265 HCAPLUS

DOCUMENT NUMBER: 124:94143

TITLE: The annealing effect on the durabilities of  
La-substituted CaNi<sub>5</sub>-type alloys

AUTHOR(S): Li, Z. P.; Suda, S.

CORPORATE SOURCE: Tokyo, 192, Japan

SOURCE: Journal of Alloys and Compounds (1995), 231(1-2),  
835-40

CODEN: JALCEU; ISSN: 0925-8388

PUBLISHER: Elsevier

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The annealing effects of the Ca-La series of alloys on homogenization and durability improvement have been investigated using X-ray diffraction, microg. and electrochem. measurement. It was found that annealing has no effect on the electrochem. durability of the La-free Ca-containing alloy although it can be well homogenized. The phase structure of La-substituted CaNi<sub>5</sub>-type alloys was only changed a little by annealing the alloy at 900°C for 3h, but the electrochem. durability could be improved. A high temperature, longer anneal of the Ca-La series of alloys enabled better electrochem. cycling durability to be attained. The discharge capacity of the annealed alloys was decreased a little because of the vaporization of Ca when annealing for a long time.

L53 ANSWER 34 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1996:44250 HCAPLUS

DOCUMENT NUMBER: 124:121950

TITLE: A new family of hydride electrode materials based on CaNi<sub>5</sub>-type alloys

AUTHOR(S): Li, Z. P.; Suda, S.

CORPORATE SOURCE: Tokyo, 192, Japan

SOURCE: Journal of Alloys and Compounds (1995), 231(1-2), 751-4

CODEN: JALCEU; ISSN: 0925-8388

PUBLISHER: Elsevier

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A new family of low-cost hydride electrode materials based on CaNi<sub>5</sub> was studied. CaNi<sub>5</sub>-series alloys showed the same charge-discharge potential as RNi<sub>5</sub>-type alloys (R = rare earth metal). A CaNi<sub>5</sub> electrode can reach the capacity of 400 mA-h/g but only can last a few cycles in an alkaline electrolyte. The extra high capacity of CaNi<sub>5</sub> might be brought by Ca corrosion. The CaNi<sub>5</sub>-type alloys after element substitution demonstrated a discharge capacity of 300-350 mA-h/g at a discharge current of 150 mA/g. Comparing with B-side substitution in AB<sub>5</sub>, A-side substitution is more effective on the durability improvement and keeps the discharge capacity at a high value. Rare earth and alkaline earth substitution can dramatically improve the cycling durability. This is attributed to the lattice stabilization of the alloy and size stabilization of the hydride particles as well as anti-corrosion improvement of the alloy. Zr and Ti addition in Ca<sub>0.4</sub>La<sub>0.6</sub>Ni<sub>4.7</sub>Al<sub>0.3</sub> can improve the durability further. The A-rich non-stoichiometric alloy (AB<sub>5</sub>-type Ca-based alloy) showed higher discharge capacity but poorer durability compared with a stoichiometric compound

L53 ANSWER 35 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1996:44220 HCAPLUS

DOCUMENT NUMBER: 124:122029

TITLE: Effects of hydriding-dehydriding cycling on P-C-T and electrochemical properties of La-Ca-Ni-Al alloys

AUTHOR(S): Li, Z. P.; Suda, S.

CORPORATE SOURCE: Tokyo, 192, Japan

SOURCE: Journal of Alloys and Compounds (1995), 231(1-2), 594-7

CODEN: JALCEU; ISSN: 0925-8388

PUBLISHER: Elsevier

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The effect of hydriding-dehydriding cycling on electrochem. capacity, durability, and pressure-composition-temperature (P-C-T) characteristics of  $\text{Ca}_{1-x}\text{La}_x\text{Ni}_{4.7}\text{Al}_{0.3}$  alloys ( $x = 0, 0.2, \text{ and } 0.6$ ) was investigated at  $40^\circ$ . The La-substituted alloys showed a smaller electrochem. capacity degradation than  $\text{CaNi}_5$  after 40 hydriding-dehydriding cycles at  $40^\circ$ . Compared with uncycled alloys, La-substituted Ca-based alloys showed better durability with the exception of La-free  $\text{CaNi}_{4.7}\text{Al}_{0.3}$ .

L53 ANSWER 36 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN  
ACCESSION NUMBER: 1995:649767 HCAPLUS  
DOCUMENT NUMBER: 123:95902  
TITLE: Electrochemical properties of the chemically treated  
LaNi<sub>4.7</sub>Al<sub>0.3</sub> and MmNi<sub>3.5</sub>Co<sub>0.7</sub>Al<sub>0.8</sub>  
AUTHOR(S): Yan, D. -Y.; Li, Z. -P.; Suda, S.  
CORPORATE SOURCE: Department Chemical Engineering, Kogakuin University,  
Hachioji, 192, Japan  
SOURCE: Transactions of the Materials Research Society of  
Japan (1994), 18B, 1217-19  
CODEN: TMRJE3; ISSN: 1382-3469  
DOCUMENT TYPE: Journal  
LANGUAGE: English  
AB The effects of the chemical treatment by an aqueous solution which contains  
fluorine  
(F-treatment) on the electrochem. properties of LaNi<sub>4.7</sub>Al<sub>0.3</sub> and  
MmNi<sub>3.5</sub>Co<sub>0.7</sub>Al<sub>0.8</sub> alloys was investigated. The F-treatment improved the  
electrochem. activation characteristics of LaNi<sub>4.7</sub>Al<sub>0.3</sub>. The treated  
MmNi<sub>3.5</sub>Co<sub>0.7</sub>Al<sub>0.8</sub> improved significantly the charge discharge cycle life.

L53 ANSWER 37 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1995:649766 HCAPLUS

DOCUMENT NUMBER: 123:95901

TITLE: Activation of  $\text{Zr}_{0.5}\text{Ti}_{0.5}\text{V}_{0.75}\text{Ni}_{1.25}$  electrodes by hot alkaline solutions

AUTHOR(S): Yan, Deyi; Sandroock, Gary; Li, Zhoupeng;

Wang, Xianglong; Suda, Seijirau

CORPORATE SOURCE: Department Chemical Engineering, Kogakuin University, Hachioji, 192, Japan

SOURCE: Transactions of the Materials Research Society of Japan (1994), 18B, 1213-16

CODEN: TMRJE3; ISSN: 1382-3469

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Hot alkaline treatment of the multiphase alloy  $\text{Zr}_{0.5}\text{Ti}_{0.5}\text{V}_{0.75}\text{Ni}_{1.25}$  results in significant surface corrosion, with at least some of the corrosion products being soluble in the treating solution. The corrosion process generates

H that is largely absorbed by the alloy during treatment, resulting in heterogeneous particle cracking and significant electrochem. discharge capacity ( $C_0$ ) even before the 1st deliberate charge. The discharge capacity ( $C_1$ ) after the 1st deliberate charge is significantly increased by hot alkaline treatment.  $C_0$  is a direct measure of alloy corrosion during the hot alkaline treatment and should be minimized in practice.  $C_1$  is a measure of electrochem. activation rate and should be maximized in practice. Another important parameter is the maximum capacity  $C_{\text{max}}$ . The effects of treatment time and temperature, as well as solution (KOH vs. NaOH)

on

$C_0$ ,  $C_1$  and  $C_{\text{max}}$  are presented, along with some long-time cyclic capacity data.

L53 ANSWER 38 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1995:649765 HCAPLUS

DOCUMENT NUMBER: 123:95900

TITLE: The effects of F-treatment level on the electrochemical behavior of LaNi<sub>4.7</sub>Al<sub>0.3</sub>

AUTHOR(S): Li, Z. P.; Yan, D. Y.; Suda, S.

CORPORATE SOURCE: Department Chemical Engineering, Kogakuin University, Hachijio, 192, Japan

SOURCE: Transactions of the Materials Research Society of Japan (1994), 18B, 1209-12  
CODEN: TMRJE3; ISSN: 1382-3469

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The F-treatment has good effects on improving the activation of LaNi<sub>4.7</sub>Al<sub>0.3</sub> electrodes. Short-term treatments are good for higher capacities and lower charge potentials. It also can improve the electrode kinetic properties. Appropriate F-treatments can improve the galvanostatic cycling durabilities of the LaNi<sub>4.7</sub>Al<sub>0.3</sub> electrodes without decreasing their kinetic properties. A phys. model is proposed to explain these results.

L53 ANSWER 39 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1995:487772 HCAPLUS

DOCUMENT NUMBER: 122:295255

TITLE: The fluoride protection mechanism during CaNi<sub>5</sub> electrode cycling in the F<sup>-</sup> ion containing KOH electrolyte

AUTHOR(S): Li, ZhouPeng; Matsuoka, Takashi; Sandroek, Gary; Uchida, Masaki; Suda, Seijirau

CORPORATE SOURCE: Kogakuin Univ., Tokyo, 163-91, Japan

SOURCE: Kogakuin Daigaku Kenkyu Hokoku (1994), 77, 77-9

CODEN: KDKHAY; ISSN: 0368-5098

PUBLISHER: Kogakuin Daigaku

DOCUMENT TYPE: Journal

LANGUAGE: Japanese

AB F<sup>-</sup> ion addition in KOH electrolyte can improve the cycling durability of CaNi<sub>5</sub> electrode dramatically. Using phys. and electrochem. analyses, the durability improvement mechanism was investigated. The fluoride layers are formed on the surfaces of CaNi<sub>5</sub> particles when discharging in F<sup>-</sup>-containing KOH solution. The produced CaF<sub>2</sub> film is more protective than the Ca(OH)<sub>2</sub> formed during cycling in KOH solution; therefore, the cycling durability of CaNi<sub>5</sub> electrode was improved.



L53 ANSWER 40 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1995:487771 HCAPLUS

DOCUMENT NUMBER: 123:37119

TITLE: The effect of element substitution in CaNi<sub>5</sub> on the durability improvement of CaNi<sub>5</sub>-type electrodes

AUTHOR(S): Li, ZhouPeng; Kanazashi, Masato; Sandroek, Gary; Uchida, Masaki; Suda, Seijirau

CORPORATE SOURCE: Kogakuin Univ., Tokyo, 163-91, Japan

SOURCE: Kogakuin Daigaku Kenkyu Hokoku (1994), 77, 71-5  
CODEN: KDKHAY; ISSN: 0368-5098

PUBLISHER: Kogakuin Daigaku

DOCUMENT TYPE: Journal

LANGUAGE: Japanese

AB The effects of Ni substitution with Al and Co as well as Ca substitution with La in CaNi<sub>5</sub> on the durability improvement when cycling in KOH solution were investigated. Co substitution improved the cycling durability in late cycles. Ca substitution with La also improved the cycling durability in KOH solution appreciably. However, Al substitution has no effect on the durability improvement. The structural and metallog. analyses of these alloys have been done in order to understand the durability improvement mechanism.

L53 ANSWER 41 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1995:469996 HCAPLUS

DOCUMENT NUMBER: 122:269997

TITLE: Electrochemical durability of Ca-based alloys

AUTHOR(S): Li, Z. P.; Suda, S.

CORPORATE SOURCE: Dep. Chem. Eng., Kogakuin Univ. Nakano, Tokyo, 192,  
Japan

SOURCE: Electrochimica Acta (1995), 40(4), 467-71

CODEN: ELCAAV; ISSN: 0013-4686

PUBLISHER: Elsevier

DOCUMENT TYPE: Journal

LANGUAGE: English

AB In order to improve the cycling durability of Ca-based alloy in KOH solution as hydride electrode in Ni-H battery, we investigated the substitution effects by using Al and Co to substitute nickel as well as alkaline earth metals and rare earth elements to calcium in CaNi<sub>5</sub>. It was found that rare earth and alkaline earth substitution can significantly improve the cycling durability during electrochem. charging and discharging. Comparing with A-site substitution in AB<sub>5</sub>, B-site substitution by Al or Co shows little improvement on the durability. The structural and metallog. analyses have been done to understand the substitution effects.

L53 ANSWER 42 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1995:357547 HCAPLUS

DOCUMENT NUMBER: 122:138069

TITLE: The inorganic compound coating effect on the durability of CaNi5 electrode

AUTHOR(S): Li, Z. P.; Suda, S.

CORPORATE SOURCE: Dep. Chem. Eng., Kogakuin Univ., Tokyo, 192, Japan

SOURCE: Proceedings - Electrochemical Society (1994), 94-27(Hydrogen and Metal Hydride Batteries), 78-84  
CODEN: PESODO; ISSN: 0161-6374

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB F- ion addition in KOH electrolyte can improve the electrochem. cycling durability of CaNi5 electrode dramatically. The durability improvement mechanism was investigated through phys. and electrochem. analyses. Fluoride layers will be formed on the surfaces of CaNi5 particles during cycling CaNi5 electrode in F- ion containing KOH electrolyte. The formed calcium fluoride is more protective against the corrosion of strong alkaline solution than calcium hydroxide that was formed when the electrode was cycling in pure KOH electrolyte. With increasing the F- ion content in the electrolyte, the durability of CaNi5 electrode can be improved very much but the discharge capacity was decreased because of the ion conductivity loss.

L53 ANSWER 43 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1995:357541 HCAPLUS

DOCUMENT NUMBER: 122:138065

TITLE: The metallurgical and electrochemical investigations of Ca-La-(NiAl)<sub>5</sub> alloys

AUTHOR(S): Li, Z. P.; Suda, S.

CORPORATE SOURCE: Dep. Chem. Eng., Kogakuin Univ., Tokyo, 192, Japan

SOURCE: Proceedings - Electrochemical Society (1994), 94-27 (Hydrogen and Metal Hydride Batteries), 16-23  
CODEN: PESODO; ISSN: 0161-6374

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The effects of lanthanum substitution for calcium in Ca<sub>1-x</sub>La<sub>x</sub>Ni<sub>4.7</sub>Al<sub>0.3</sub> on metallog., structure and electrochem. properties. have been investigated. It was found that cored dendritic structure existed and some segregation of Ca and La occurred on solidification. Lanthanum substitution can dramatically decrease the amount of A<sub>2</sub>B<sub>7</sub> phases, which was caused by high vapor pressure of Ca and non-equilibrium solidification of the alloy. From the results of X-ray lattice parameter measurement, the compactness of Ca-La-(NiAl)<sub>5</sub> alloys linearly increases with increasing the La substitution amount. La substitution can obviously improve the electrochem. durability of the alloy by lattice stabilization and anti-corrosion capability improvement in strong alkaline solution.

L53 ANSWER 44 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1994:609064 HCAPLUS

DOCUMENT NUMBER: 121:209064

TITLE: Rate capacity determination mechanism of F-treated  
LaNi<sub>4.7</sub>Al<sub>0.3</sub> electrode

AUTHOR(S): Li, Zhoupeng; Yan, Deyi; Suda,  
Seijirau

CORPORATE SOURCE: Zhejiang Univ., Hangzhou, Peop. Rep. China

SOURCE: Kogakuin Daigaku Kenkyu Hokoku (1993), 75, 113-22

CODEN: KDKHAY; ISSN: 0368-5098

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A math. model of a rate capacity determination mechanism of LaNi<sub>4.7</sub>Al<sub>0.3</sub> as a  
hydride electrode is established, based on the hydride electrode kinetics  
and capacity degradation mechanism. Rate cycling behavior of the F-treated  
electrode was investigated. Treatment with F enhances its durability.

L53 ANSWER 45 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 1994:609063 HCAPLUS

DOCUMENT NUMBER: 121:209063

TITLE: Effects of F treatment on durability of LaNi<sub>4.7</sub>Al<sub>0.3</sub> electrode

AUTHOR(S): Li, Zhoupeng; Yan, Deyi; Suda, Seijirau

CORPORATE SOURCE: Zhejiang Univ., Hangzhoud, Peop. Rep. China

SOURCE: Kogakuin Daigaku Kenkyu Hokoku (1993), 75, 107-12

CODEN: KDKHAY; ISSN: 0368-5098

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Treatment of LaNi<sub>4.7</sub>Al<sub>0.3</sub> as a hydride electrode with F to coat it with fluoride enhances its charge-discharge cycle durability. However, the coating layer is finely cracked, when exposed to the cycles for an extended period, which decreases capacity of the electrode.

L53 ANSWER 46 OF 46 HCAPLUS COPYRIGHT 2006 ACS on STN  
ACCESSION NUMBER: 1994:609062 HCAPLUS  
DOCUMENT NUMBER: 121:209062  
TITLE: Electrode kinetics of F-treated LaNi<sub>4.7</sub>Al<sub>0.3</sub>  
electrodes  
AUTHOR(S): Li, Zhoupeng; Yan, Deyi; Suda,  
Seijirau  
CORPORATE SOURCE: Zhejiang Univ., Hangzhou, Peop. Rep. China  
SOURCE: Kogakuin Daigaku Kenkyu Hokoku (1993), 75, 99-106  
CODEN: KDKHAY; ISSN: 0368-5098  
DOCUMENT TYPE: Journal  
LANGUAGE: English  
AB An attempt was made to correlate rate capacity of LaNi<sub>4.7</sub>Al<sub>0.3</sub> as a  
hydride electrode with discharge c.d. The electrode reaction is  
controlled by the electrochem. reaction occurring on the catalytic sites  
in a high current discharge region. Treatment with F enhances kinetic  
characteristics of the electrode.

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